ROSS HOSPITAL 1 INSTITUTE LONDON. S.W.15

Property of the ROSS INSTITUTE.
Case No. 29

Sir William Simpson

AC 174

ZANZIBAR PROTECTORATE.

LIBRARY
13 FEB 1934

Medical and Sanitary Report

FOR THE YEAR 1913.

174

22501397609

ZANZIBAR PROTECTORATE.

Medical and Sanitary Report

FOR THE YEAR 1913.

WELLCOME INSTITUTE
LIBRARY
Coll. [illegible]
Call
No.
+
AnneK p
WA28
.H73
Z34
1912

13 FEB [illegible]

MEDICAL DEPARTMENT REPORT FOR 1913.

PART I—ZANZIBAR.

EUROPEANS.

General.—During the year 1913 the general health of the European community has on the whole been satisfactory.

Four European children were born in Zanzibar—two British, one German, one Portuguese.

Six deaths occurred, four amongst residents proper. The several causes of death were organic disease of the heart, cerebral malaria, capillary bronchitis and chronic cystitis.

Common Ailments.—Digestive disorders, catarrhal conditions, benign tertian malaria, rheumatism and neurasthenic manifestations have as usual been the most common forms of illness amongst residents.

Invaliding of Officials.—No official was invalided during the year.

Hospital Accommodation.—The large Arabic building known as the "Mambo Msiige" or "Do not copy these doings," originally built by an Arab, occupied by the Universities Mission, purchased by the British Government as a British Consulate, and utilised since as temporary Zanzibar Government Offices, was opened in April as a temporary European Hospital. A large roomy building, it occupies a site close on the shore fully exposed to the N.E. or hot season monsoon. Unfortunately its distance from the existing Native and Subordinates Hospital precludes the possibility of the economy in nursing staff, supplies, dispensary, compounder, etc., which it was hoped might have been obtained had a new hospital for Europeans been built in the vicinity of the native one. However, the acquisition of even temporary accommodation is already proving of the utmost benefit.

Constructed as all big Arab houses, of a quadrangle of rooms in two storeys enclosing a large rectangular open court or well, there is much unnecessary passage space, obstruction to through ventilation, and exaggeration of all noises emerging from the rooms which on the first floor open on to a wide inner masonry verandah running round the entire building. The Arab architecture, with heavy ornamented masonry pillars, plaster wall decorations, cumbrous carved doors and door frames, wall recesses and shelves, is unsuitable in a hospital building owing to accumulation of dust.

The central court or well, which was originally intended to be roofless, and, as in all Arab houses, to receive rain, floor and house waste drainage, has been roofed in. Unfortunately, instead of raising the area of roofing above the masonry parapet surrounding this originally open space, a very clumsily constructed roof has been set in, supported on heavy inside beams and ornamental iron brackets. This darkens the whole well of the building, entirely cuts off all top ventilation and allows of no perflation of direct breeze; in addition, owing to its lower level than the surrounding flat concrete main roof, it accumulates rain water where mosquito larvæ have frequently been found, and its only drainage is down through the centre of the building on to the main ground floor. The removal of this area of roofing and the construction of a flat expanded metal and concrete roof some three feet above the existing parapet, with open sides, would give more light and excellent ventilation, do away with inside rain pipes and would enable the sisters from their isolated quarters to obtain a direct view of the inner verandahs and main stairway.

At the close of the year four large first class rooms and a special maternity room had been completed and furnished on the first floor, with operating room and necessary bathroom, closet, pantry, store room, etc.

The upper rooms, occupying a part of the extensive flat roof, had been adapted as quarters for the two nursing sisters in charge.

It is hoped that the structural alterations necessary before the ground floor rooms can be opened for second class patients, dispensary, etc., will be completed early next year.

CASES TREATED.

Month.	Government.	Non-Government.	
May...	4	1	
June	3	—	
July...	1	4	
August	3	1	
September	1	—	
October	—	—	
November	—	1	
December	1	—	
	13	7	Total 20

SUBORDINATE OFFICIALS.

All Subordinates working in the Districts are compelled to take prophylactic quinine weekly.

NATIVES.

Commoner Diseases.—Ulcers, rheumatism, bronchitis, venereal diseases, malaria and filarial affections predominate.

The undoubted increase in Ankylostomiasis or "Hook Worm" infection, and the evident widespread incidence of the disease throughout both islands, is extremely serious and calls for combined action on the part of Medical and Health Departments for its eradication.

This disease, primarily due to the presence of many minute worms (Ankylostoma Duodenale) in the small bowel, is characterized by progressive anæmia of a very severe type with concomitant dilatation of heart, dropsy, breathlessness and vertigo, ultimately leading to fatty degeneration of heart, liver and kidneys. Very gradual and insidious in onset, the disease soon produces absolute inability to perform any work and renders its victims very prone to intercurrent fatal illnesses.

The eggs discharged in the excreta rapidly develop if in warm moist soil, and persons are infected by eating food or drinking water contaminated with such tainted soil or by eating with soiled hands. Preventive measures must include treatment of sick persons, prevention of broadcast defæcation on the surface of the soil, the construction of cesspits or shallow trenches for fæces in dry soil and in efforts to encourage greater cleanliness in the preparation of food and in the washing of hands (particularly after the Mahomedan custom of washing the parts with water after the act of defæcation). If, as has been suggested, the worms in moist ricefields and swamps can get access to the intestine through the skin of the feet and legs, then the legs of coolies working in such places should be smeared with some impermeable substance as pitch.

The natives themselves state that the disease, which they know as "Safura," has become more common and more severe.

Police and Sepoys.—There has certainly been an improvement in the general health of these men during the last few years.

Of 225 applicants for service in Police or Prison Departments, 35 (15·5 per cent.) were found unfit, mainly on account of herniæ, cardiac troubles and defective vision. The figures are interesting as occurring amongst men from whom the evidently unfit have already been weeded.

King's African Rifles and Armed Constabulary.—The latter force was disbanded in September and replaced in the next month by a second Company of K.A. Rifles. The Companies are severally recruited from Kavirondo and Nyassa natives.

The following list shows the number of native soldiers from the K.A.R. and Zanzibar Armed Constabulary admitted as in-patients each month to the Ziwani and Zanzibar Government Hospitals, with the case incidence of Malaria and dysenteric diarrhœa:—

ZIWANI HOSPITAL.

Month.	All Diseases.	Deaths.	Malaria.	Dysenteric Diarrhœa.
January	39	—	20	1
February	30	—	17	—
March	41	—	28	—
April	22	—	9	1
May	27	—	9	1
June	28	—	13	1
July	19	—	4	—
August	10	—	1	—
September	13	—	2	—
October	12	—	2	—
November	27	—	8	1
December	11	—	4	—
Monthly average	23·2	—	9·7	0·4
Do. do. 1912	23·0	—	7·8	6·3

ZANZIBAR GOVERNMENT HOSPITAL.

Month.	All Diseases.	Deaths.	Malaria.	Dysenteric Diarrhœa.
January	19	—	6	—
February	5	—	1	—
March	8	—	4	—
April	7	—	3	—
May	9	—	—	—
June	3	—	—	—
July	8	—	—	—
August	5	—	—	—
September	5	—	—	—
October	2	—	—	—
November	7	—	—	1
December	5	—	1	1
Monthly average	6·9	—	1·2	0·1
Do. do. 1912	10·0	—	1·5	1·7

Except for a marked diminution in cases of dysenteric diarrhœa, these monthly averages are slightly higher than for 1912 :—

Year.	All diseases.	Malaria.	Dysenteric Diarrhœa.
1911	125·9	28·6	10·0
1912	33·0	9·3	8·0
1913	40·1	11·0	0·5

The only death amongst the forces was caused by cerebral congestion, the result of suicidal hanging.

No epidemic of infectious disease occurred.

Two children from the lines died of pneumonia and capillary bronchitis.

Further clearing of scrub, felling of trees, and diligent search for mosquito larvæ and promiscuous disposal of rubbish have resulted in a noticeable diminution in both mosquitoes and flies throughout the men's lines.

The prophylactic administration of quinine to men, women and children twice weekly has been continued.

It is of interest that on felling some mango trees close to the officers' quarters, with the object of giving greater exposure to breeze, two of the trunks were found to be hollow and contain quantities of water. This presumably explains how these quarters have been so infested with mosquitoes, the origin of which could not be discovered.

Government Hospital for Natives and Subordinates.—The total number of patients registered at this Hospital was 10,590, an increase of 2,181 over the total for 1912, when all previous records had been exceeded.

	In-patients.	Out-patients.	Total.
1907	902	5,743	6,645
1908	1,299	7,089	8,388
1909	1,050	6,108	7,158
1910	1,169	5,771	6,940
1911	1,282	6,910	8,192
1912	1,230	7,179	8,409
1913	1,503	9,087	10,590

Deaths amongst in-patients numbered 52, a percentage of 3·4 to the number of patients admitted, a reduction of 0·6 from the mortality for 1912.

IN-PATIENTS.

Month.	Admissions.	Daily Average Number.	Total Attendances.
January	172	38·06	1,180
February	143	40·32	1,129
March	131	43·06	1,335
April	117	36·36	1,091
May	173	38·48	1,193
June	157	44·53	1,336
July	113	38·71	1,204
August	101	32·58	1,010
September	77	30·69	921
October	82	31·80	986
November	120	39·93	1,198
December	117	38·03	1,197
	1,503		13,762

OUT-PATIENTS.

Month.	Number of New Patients.	Total Attendances.	Average Total Daily Attendance.
January	715	1,741	56·1
February	730	1,646	58·7
March	754	1,763	56·8
April	723	1,750	58·3
May	788	1,708	55·0
June	843	1,769	58·9
July	648	1,599	51·5
August	706	1,486	47·9
September	613	1,382	46·0
October	735	1,340	43·2
November	880	1,724	57·4
December	952	1,731	55·8
	9,087	19,639	—

During the year 148 operations were performed under general anæsthetics.

SHAMBA DISPENSARIES.

The number of patients attending these Dispensaries is satisfactory, and would seem to justify the opening of further Dispensaries in other districts.

MKOKOTONI.

Year.	In-Patients.	Out-Patients.	Total.
1910	—	870	870
1911	27	1,328	1,355
1912	51	2,252	2,303
1913	49	2,338	2,387
	CHUAKA.		
1910	—	1,261	1,261
1911	—	1,142	1,142
1912	—	1,380	1,380
1913	9	1,085	1,094

MKOKOTONI DISPENSARY.

Month.	No. of Out-Patients.	Total Attendances. Out-Patients.	In-Patients.
January	186	326	4
February	189	465	1
March	176	336	2
April	231	471	5
May	226	1,139	7
June	221	635	4
July	206	631	4
August	163	462	6
September	171	520	5
October	172	415	5
November	196	500	2
December	201	514	4
Totals	2,338	6,409	49

CHUAKA DISPENSARY.

Month.	No. of Out-Patients.	Total Attendances. Out-Patients.	In-Patients.
January	110	124	—
February	69	81	2
March	44	58	1
April	66	109	1
May	119	144	—
June	111	127	—
July	105	120	2
August	87	96	—
September	114	157	2
October	100	147	—
November	74	83	—
December	86	119	1
Totals	1,085	1,365	9

Among structural additions, new kitchens and latrines were constructed at Mkokotoni Dispensary.

Prophylactic quinine is served out to clerks, office boys, police, prisoners, etc.

The following figures obtained from the Birth and Death Registers for the plantation districts disclose a serious state of affairs.

The number of deaths recorded is probably accurate, since relatives of the deceased may benefit to some extent in the division of property.

The figures for births are certainly inaccurate, parents gain nothing by reporting births, the dread of a poll tax or some such imposition by Government seems to exist, and native superstitions regarding the "evil eye" are prevalent.

It is impossible to estimate the error in these figures, but if one even grants that only one half of the births are reported a very grave condition apparently obtains.

In the following figures those for 1912 have been separated as the occurrence of a cholera epidemic in that year makes them abnormal, but the other four years may be considered to be normal :—

MWERA DISTRICT.

Year.	Births.	Deaths.	Excess of deaths over births.
1909	239	593	354
1910	273	740	467
1911	246	740	494
1913	254	766	512
(1912 Cholera.	186	1,071	885)

CHUAKA DISTRICT.

Year.	Births.	Deaths.	Excess of deaths over births.
1909	336	417	81
1910	389	390	1
1911	248	433	185
1913	293	334	41
(1912 Cholera.	257	836	579)

MKOKOTONI DISTRICT.

Year.	Births.	Deaths.	Excess of deaths over births.
1909	341	765	424
1910	529	1,029	500
1911	640	1,258	618
1913	634	890	256
(1912 Cholera.... ...	626	1,200	574)

The totals for these districts for the four "normal" years are as follows :—

	Births.	Deaths.	Excess of deaths over births.
Chuaka	1,012	2,839	1,827
Mwera	1,266	1,574	308
Mkokotoni	2,144	3,942	1,798
	4,422	8,355	3,933

If the true figure for births during those four normal years was twice the recorded number, then in those four years the births exceeded the deaths by only 489 throughout these districts, an average increase of only 122 per annum for the island population outside the town precincts.

When other factors which deplete population are considered, such as the high infant mortality between the ages 0–5 years, emigration of adults, the occurrence of epidemics, etc., a very much larger figure than this 122 would be quite insufficient to maintain even a stationary population.

Considering the absolute dependence of these islands upon agricultural produce and hence upon native labour, this apparent gradual depletion in population would appear to be most serious.

In April, 1907, before any real attempt was made to obtain registration of births and deaths, we expressed our opinion in a "Report upon the Question of a Decrease in the Native Population of Zanzibar, its Causes, and any suggested Remedies."

Amongst other suggestions we urged the establishment of suitably equipped dispensaries at different points through the island where men sufficiently trained to treat common illnesses should be stationed. In addition to such duties it was hoped these men would get a knowledge of the people in their district, be able to assist in educating natives in sanitary matters, carry on vaccination, help in the registration of births and deaths, arrange for the removal of more serious cases of illness to the central town hospital, etc.

For the entire population of the island outside the town there are only two such dispensaries, Mkokotoni and Chuaka ; the latter, in rather a sparsely populated and poor district and placed too far from the village, is not an absolute success, but that at Mkokotoni is doing excellent work, and has more than justified its existence.

We would urge that further dispensaries be opened, and would suggest the following as useful centres for their establishment :—

Mwera.
Chaani.
Makunduchi.
Nguja Kuu.
Mwangapwani.

Such dispensaries should be placed right in the middle of a village or close to the village market place ; there is little use placing them as at Chuaka near European bungalows and offices, or, as at Mkokotoni, where patients must go directly past such buildings to reach the dispensary.

Compounders gain ample experience of minor medicine and surgery in our central town hospital ; it remains to select from them the individuals who are keen and trustworthy and who will take a real and active interest in their work and district.

ASYLUM FOR INSANE NATIVES.

With the inclusion of the previous blocks of the Kilimani Asylum in the newly-erected Kilimani Central Goal the inmates were evicted in March and temporarily lodged in the old "Barracks" until such time as a proper Asylum may be constructed.

	Remaining at the end of 1912.	Admitted 1913.	Discharged.	Deaths.	Remaining end of 1913.
Males	6	13	8	5	6
Females	6	4	4	4	2
	12	17	12	9	8

A site in the neighbourhood of Kilimani Prison is proposed as the most suitable for the new Asylum.

PRISONS.

Kilimani Central Prison.—During the first two months of the year the prisoners were still lodged in Chukwani Palace owing to the occurrence of cholera amongst them when confined in the old Native Gaol or "Barracks" during the previous year. Early in March they were moved into the newly opened Kilimani Prison.

Whilst at Chukwani (distant 6 miles) they were attended by a resident compounder, a medical officer visiting them every second day.

During March, April and May out-patients amongst them were marched in to the Native Hospital for treatment, but since June 1st out-patients have been attended in the prison daily by the Hospital Assistant in residence at the Ziwani K. A. R. Lines.

Prisoners requiring admission to hospital have of course been admitted to the Prison Ward in the Native Hospital as heretofore.

Between the months March to August there was an epidemic of 39 cases of Mumps.

PRISONERS.

Month.	No. of Out-patients.	Total attendances Out-patients.	In-patients.
January	36	55	19
February	27	36	10
March	106	311	18
April	147	381	18
May	154	495	22
June	87	485	23
July	102	588	13
August	65	397	12
September	50	422	8
October	67	437	7
November...	58	435	5
December...	78	604	8
Totals	977	4,646	163

Amongst patients treated in the prisoners' ward there occurred seven deaths from the following causes :—

Pneumonia	2	
Dysenteric Diarrhœa	2	
Debility and Diarrhœa	1	
Tertiary Syphilis	1	
Paralysis and Exhaustion	1	(criminal insane)
	7	

Of the 163 in-patients 34 (20·8 per cent.) were treated for Ankylostomiasis.

The new Kilimani Central Prison seems to be most satisfactory in design, construction and hygiene. The cells have been made as nearly mosquito proof as seems practicable, the scrub all round the enclosing walls has been levelled and bulky mango trees have been felled. The tearing up of some of the original faulty cesspits and drains, and the substitution of open surface drains within the precincts of the prison, has been a great improvement. Free flushing of the outside drains should be of little difficulty when the automatic flushing water tank is erected.

The dryness and light loamy nature of the soil makes disposal of excreta in surface pits both simple and wholesome. It is very remarkable how rapidly complete disintegration of the excreta is accomplished under such conditions.

The preventive measures against *Cholera* introduced in 1911 are still carried out, viz. :—

1. Boiling of all drinking water, and its storage in locked receptacles with taps.
2. All water used for washing purposes is made unpalatable by the addition of disinfecting fluid.
3. Washing of hands before eating.
4. Scalding of all cooking and eating utensils.
5. Distribution of fly papers about kitchen.
6. Each prisoner carries his own drinking mug and has a separate plate of food.

As local experience rather pointed to vermin as a possible factor in the spread of the virus of *Beri-Beri* all coir sleeping mats are boiled weekly, as they had previously, in the old native gaol, been found infested with bugs, as were the cell walls. The new cells are lined with cement to a height of some four feet and all corners rounded off.

In connection with Beri-Beri amongst prisoners the following figures are interesting :—

Year.	Number of new cases.	Deaths.
1908	14	2
1909	19	1
1910	13	0
1911	8	1
1912	2	0
1913	4	0

The boiling of mats was begun in November, 1910.

When the entire Kilimani Prison building is completed, including the *Prison Infirmary*, medical treatment of prisoners will be much more efficiently carried out. At present, as in past years, the only accommodation for prisoners requiring hospital treatment as in-patients is the Prisoners' Ward in the Native Hospital, which is overcrowded when occupied by eight beds, is frequently extremely insanitary with dysenteric, surgical, pneumonia, etc., cases all confined together, requires a constant guard of warders, increases facilities for escape and probably renders easy communication between sick prisoners and their friends. Frequently, with the eight beds occupied, one is compelled to discharge a prisoner still requiring nursing in order to admit a more acute case.

Female prisoners are of necessity admitted into the ordinary female ward of the hospital, which is unfair upon the other patients, and where there is no prison supervision.

Examination of Prisoners.—Every prisoner is medically examined before admission to prison and prior to receiving corporal punishment; fitness for hard or light labour and weight are recorded. The following is the number of prisoners so examined during the year :—

Males	780
Females	37
	817

The males examined showed the following illnesses, etc., in the percentage stated :—

Gonorrhœa	9·4 per cent.
Hydrocele	4·6 ,,
Herniæ	4·2 ,,
Cardiac Lesions	4·1 ,,
Penile sores	2·4 ,,
Anæmia	2·0 ,,
Enlarged spleen	1·4 ,,

In addition to attendance to sick prisoners and inspection of prison buildings twice each week a medical officer examined every prisoner stripped once a week for infectious, contagious, venereal, etc., diseases.

District Prisons (Chuaka, Mkokotoni, Mwera).—These are satisfactory. Similar measures to prevent malaria, cholera, beri-beri, etc., are carried out as in the Central Gaol.

STAFF.

Dr. MacDonald, P.M.O., was on duty in Zanzibar throughout the year. He paid a visit of inspection to Pemba in August and accompanied the First Minister to Daresalam for a few days to visit the European Hospital.

Dr. Curwen, S.M.O., returned from privilege leave on January 1st; was on duty in Zanzibar except for two short periods in Pemba.

Dr. de Souza, M.O., proceeded to Europe on privilege leave on January 14th, returning on August 1st after an extension of two months for health reasons. On two occasions he temporarily acted Medical Officer in Pemba.

Dr. Nariman, M.O., with the exception of two periods of one and two months in Pemba, was on duty at the Native and Subordinates' Hospital throughout the year.

Mrs. Zurcher, Matron, left for Europe on five months' privilege leave on June 13th.

Miss Cadman, Nursing Sister, proceeded to Pemba on February to relieve Miss Taylor. She acted matron in Zanzibar from June 13th.

Miss Brewerton, Nursing Sister, was on relief duty in Pemba until February 14th. She proceeded to Europe on February 24th on five months' privilege leave, returning on August 10th, when she was detailed for duty in the temporary European hospital.

Miss Chambers, Nursing Sister, except for a short period at the European Hospital was on duty at the Native and Subordinates' Hospital throughout the year.

Miss Slade, Nursing Sister, after duty at the Native and Subordinates' Hospital, was appointed to the European Hospital on its being opened in April. On September 30th she proceeded home on urgent private affairs and was there invalided from the service.

Miss Motherwell, Nursing Sister, was transferred from Native to European Hospital in April. She proceeded to Pemba on two weeks' relief duty on December 29th.

Hospital Assistant Mathias, on duty at the Ziwani K.A.R. Lines, proceeded on four months' privilege leave on April 11th, returning to Ziwani in October.

Hospital Assistant Joshi, was stationed at Weti, Pemba, until April 18th, when he was resident at the Ziwani Lines until proceeding on priviiege leave on December 6th.

Compounder Livingstone, on duty at Native Hospital until proceeding on leave November to end of year.

Compounder Soloman Ramoo, in charge of Chuaka Dispensary until end of April, was then transferred to Weti, Pemba.

Compounder F. L. Gomes, transferred to Pemba in May from the Native Hospital.

Compounder F. de Cruz proceeded on privilege leave from Mkoani, Pemba, on April 28th. On his return in October 1st he was stationed at the Native Hospital.

Compounder L. A. Vaz, in charge of Mkokotoni Dispensary until the end of April was then transferred to Chuaka Dispensary.

Compounder David Gibson, on duty at the Native Hospital until April was then transferred to Mkokotoni Dispensary.

Compounder M. da Silva, was appointed on April 1st to Pemba, and was transferred for duty at Native Hospital on June 1st.

Compounder C. Almeida was appointed on April 10th and stationed at Native Hospital.

The work of the nursing staff has been excellent.

Mr. Joshi and Mr. Mathias, hospital assistants, were each in charge for six months at Ziwani, Lunatic Asylum, and Prison where they have done good work.

The work of the dispensers both in town hospital and district dispensaries has been quite satisfactory.

Mr. Martin, clerk and store keeper, has been an indefatigable worker and indispensable servant. Having no assistant his duties are numerous and his hours of duty long. Kept at work every day of the week without any holidays and severely taxed with the increased correspondence and returns he deserves a higher salary than he receives.

G. A. MacDONALD,
Principal Medical Officer.

H. CURWEN,
Senior Assistant Medical Officer.

PART II.—PEMBA.

NOTE.—*This part of the report not having been received at the time of going to press, will be published separately as an addendum.*

LONDON SCHOOL OF TROPICAL MEDICINE
LIBRARY

ZANZIBAR PROTECTORATE.

26 Nov. 1914

Medical Report on Pemba

FOR THE YEAR 1913

(Being Part II. of the Annual Medical and Sanitary Report on the Protectorate).

ANNUAL REPORT FOR 1913.

Part II.—PEMBA.

In presenting the Report for last year I would point out that I only assumed the post of Medical Officer of Pemba in the middle of September, and hence the statistics compiled are mainly the work of my predecessors, Drs. Forbes, Souza, Nariman and Carment.

Europeans.—The health of the officials has not been satisfactory. All have frequently called in the Medical Officer and most have had one or more attacks of malaria.

Dr. Carment was so seriously ill that he was sent down to Zanzibar by special steamer. Dr. Forbes, in the month of January, was invalided. Mr. Bland was invalided to Zanzibar. At Mkoani, Mr. Gilbert was repeatedly ill.

It is interesting to note the almost universal development of a chronic neurasthenic condition amongst residents, and even amongst officers only temporarily located in Pemba. Presumably the condition results from the dampness and heat of the climate, the semi-isolation and absence of any social life from smallness of community and the want of exercise.

Hospital Accommodation.—There is no provision for the hospital treatment of Europeans in Pemba, and it would be well to provide a small ward in connection with the proposed hospital at Weti. The treatment of bachelors in their own quarters with only native boys to attend to them is most unsatisfactory. It would frequently be inexpedient or dangerous to remove cases of illness to Zanzibar for hospital treatment.

Subordinate Officials.—In the earlier part of the year the routine weekly prophylactic dose of quinine had been omitted through some oversight and the incidence of malaria was heavy, since its renewal cases have been fewer, but there are still too many. Subordinates would be well advised to report themselves more frequently than once a week.

Natives.—The most common ailments for which treatment is sought are ulcerative conditions of toes and legs, the former mainly due to the depredations of the chigger flea, the latter probably due to the *herpetomonas muscæ-domesticæ*, almost invariably found microscopically in the intestine of the house-fly. Healing in both conditions is apt to be tedious, but probably is most successfully hastened by a 48 per cent. "solution" of glucose after preliminary cleansing by fomentations.

Filariasis in its various forms brings patients almost daily, and a great number have had recourse to operation, where such was possible, for Elephantiasis tumours.

Hydrocele is extraordinarily common, as is also rheumatism, both sub-acute and chronic, frequently venereal in origin.

The prevalence of constipation is remarkable, and its causation is at present a matter of study, as there would seem to be some causal agency apart from a dietary one.

Ankylostomiasis is common and cases of Bilharziasis not infrequent.

Police.—The health of these men has been satisfactory. Constipation and malaria are the conditions amongst them most often requiring treatment.

Prisoners.—It is frequently noticeable how the general condition and stamina of prisoners improve during their incarceration.

No case of Beri-Beri or other neuropathic condition has occurred. Constipation, Bronchial Catarrh and Ankylostomiasis have been frequent, and cases of Bilharziasis have been noted.

Natives' and Subordinates' Hospital.—Chake Chake alone is provided with a Hospital, and it is doing good work.

There are 24 beds for native patients with a monthly average occupation of 18·75 days. The single small ward for subordinates has been occupied nine times during the year and by non-Government patients on four occasions.

SHAMBA DISPENSARIES.

Weti.—This Dispensary has always been quite inadequate for the needs of Weti town and district, but as an hospital is to be built in 1914, no further remarks are needed.

The old dispensary building is not worth repairing.

Mkoani.—As a first dispensary in the whole southern third of the island it has done good work, but the actual population of Mkoani itself is small, although it is an important harbour for the very productive agricultural districts further inland.

STAFF.

This consists of:—

(i.) A Medical Officer, stationed at Chake Chake, who makes flying visits to the other stations periodically and when specially called.

(ii.) A Matron Nurse, stationed at Chake Chake.

(iii.) A Sub-Assistant Surgeon at Weti. He also dispenses.

(iv.) A Dispenser at Chake Chake.

(v.) A Dispenser at Mkoani.

(vi.) A Clerk, for all stations, stationed at Chake Chake.

(vii.) Swahili ward boys and ayahs.

(viii.) Cooks, etc.

The whole staff has loyally supported the Medical Officer and assisted him in every way.

Monthly Returns of Out- and In-Patients for the Year 1913.

1.—CHAKE CHAKE.

	Out-Patients.		In-Patients.
	Number of New Patients.	Total Attendances.	
A —Prisoners.			
January	34	83	4
February	39	94	6
March	45	126	7
April	34	92	4
May	27	67	3
June	34	63	3
July	28	60	4
August	17	26	1
September	16	24	1
October	11	16	2
November	25	42	2
December	21	42	1
Total	331	735	38
B.—Other Patients.			
January	318	553	38
February	300	622	33
March	264	648	34
April	254	591	31
May	266	568	38
June	230	442	26
July	235	396	21
August	183	304	15
September	252	432	27
October	262	464	41
November	246	390	31
December	337	587	33
Total	3,147	5,997	368

Out-Patients.—The increasing number calls for greater accommodation for waiting rooms (male and female), and for an out-patient dressing room.

It is proposed to request that provision be made in the 1915 estimates, not only for an out-patient building, but also for a new operation theatre. The old theatre can then be utilized as an office and consulting room for the Medical Officer. The present consulting room is far too small and is furthermore required for enlarging the Dispensary.

In-Patients.—From these figures two facts are at once to be noted :—

(i.) The accommodation of the Hospital has been taxed to its full capacity, excepting June, July, August and September, and the question of enlargement will be a crucial one before very long. On several occasions patients have had to be discharged, when a longer convalescence would have been advisable, but beds were necessary for more urgent cases.

This must be considered quite apart from any thought of the new hospital at Weti, as these institutions serve quite different districts.

The present male ward is not sufficiently well constructed as it stands to bear another storey.

This could be overcome by inserting supporting pillars with girders and building the upper storey on them. This would further add strength to the present walls, by taking off the weight of the tiled roof.

(ii.) The number of prisoners admitted as in-patients was very heavy, out of an average of 20–23 in prison per week. Later in the year there were not so many, but with more beds additional cases ought to have been admitted. I have given, as I feel right, preference to others, who had not committed offences against the law.

To obviate this another year I propose to estimate for a prison ward of six beds. They would thus have a guard, and be entirely separated from other patients.

In the meantime I suggest that the second ward in the prison itself be made an Infirmary Ward, where cases of minor degree, *e.g.*, Ankylostomiasis, Bilharziasis, etc., etc., could be treated.

MONTHLY RETURNS OF OUT- AND IN-PATIENTS FOR THE YEAR 1913.

II.—WETI.

	Out-Patients.		In-Patients.
	Number of New Patients.	Total Attendances.	
A.—PRISONERS.			
January	22	94	2
February	33	104	1
March	25	127	4
April	33	119	2
May	27	77	2
June	28	99	8
July	14	34	3
August	6	6	3
September	4	4	1
October	3	3	3
November	9	29	2
December	11	31	6
TOTAL	215	727	37
B.—OTHER PATIENTS.			
January	164	397	14
February	167	365	8
March	151	320	5
April	199	298	12
May	202	336	14
June	111	194	18
July	132	157	11
August	148	164	17
September	128	166	15
October	112	132	15
November	170	193	18
December	177	209	17
TOTAL	1,861	2,931	164

The remarks I had in mind about this Dispensary are rendered unnecessary since the new Hospital is to be built this year. Hitherto we have carried on as best we could, but I desire to point out that the six beds at the Dispensary have been fully occupied throughout the year.

41080/38 [No. 1]. No. PROOF.

ZANZIBAR.

THE BRITISH RESIDENT

to

THE SECRETARY OF STATE.

(Received 13th August, 1938.)

[*Answered by No.* .]

(No. 206.)

SIR, The Residency, Zanzibar, 6th August, 1938.

I have the honour to transmit the Annual Report* of the Medical Department for the year 1937.

2. On pages 1 to 3 of the Report will be found a summary of the more important matters and I would particularly invite attention to the following:—

Vocational Training of Native Personnel.

The results of the training of native personnel in sanitation are encouraging. When fully trained sanitary inspectors are available for posting in the rural areas a material improvement in the general sanitary conditions should follow.

Further advance in the training of native staff depends to a great extent on the provision of a hostel, lecture rooms, additional hospital wards, etc. I have at present the whole question of medical facilities generally and increased hospital accommodation under review and propose to address you separately when the financial implications have been further examined.

Medical Service for Women.

The steady advance made in medical services rendered to women and children is one of the outstanding features of the year and its success has warranted the decision to appoint a second woman medical officer, who, it is expected, will arrive in the Protectorate this autumn. It is the intention to provide a medical service for women in Pemba similar to that obtaining in Zanzibar, and in order to ensure that these services are maintained without interruption the possibility of appointing a third woman medical officer will have to be considered in due course.

Nutrition.

The dietary of the local population is a subject continually receiving the attention of Government, and although not strictly relevant to the 1937 Report it may not be out of place to indicate here some of the lines on which attempts are being made to improve conditions.

With a view to improving the quality of local cattle and increasing the milk and meat supply a policy of organized castration of inferior bulls has been started. Measures are also being considered to prevent the killing of immature animals. Later on it is thought that the introduction of graded and selected native bulls from Kenya may prove a good method of increasing the milk producing capacity of the local cows and of providing the market with all the meat which it can absorb.

Areas in the wanda country which cannot at present carry cattle owing to the absence of water supplies, may, it is hoped, be utilized for the purpose if boring operations now being undertaken prove successful.

The extension of regular weekly dipping of cattle to the outlying districts, with a view to reducing the incidence of East Coast Fever, is also under consideration.

The Director of Agriculture continues to pursue the policy of improving and increasing local production of food crops. In particular may be mentioned the efforts of the Department to introduce new varieties of vegetables which have proved successful in other tropical countries, and to improve the quality of sweet potatoes (especially the yellow variety), of yellow maize and of cassava by the introduction of new strains.

Ankylostomiasis.

A large majority of the native population in the Protectorate is infected with this disease and its control is one of the problems confronting the Department. In Section III (1) (*c*) will be found a description of an experiment in the provision of bore-hole latrines, free of cost, which is now in progress. If the results of that experiment are satisfactory a scheme for providing latrines for the whole population will be prepared and an application submitted for financial assistance from the Colonial Development Fund.

---

* Not reprinted.

Housing and Town Planning.

The congestion in certain areas of the town of Zanzibar, particularly in that portion populated by the natives known as Ng'ambo, presents a serious problem which has been somewhat neglected in the past. With a view to the preparation of a practicable scheme of town planning I have recently caused the Town Planning Board to be reorganized under the Chairmanship of the Director of Medical Services with representatives of the Provincial Administration, Public Works and Survey Departments; but even when the Town Planning Decree has been revised, regulations issued and plans published progress will inevitably be slow owing to the limitations of finance.

School Medical Services.

I am glad to be able to report the continued expansion of school medical and dental services. The reluctance previously evinced by parents and children to avail themselves of these facilities is gradually being broken down.

3. Distribution lists* of the Report are enclosed herewith.

I have, &c.,

J. HATHORN HALL,

British Resident.

---

* Not printed.

ZANZIBAR PROTECTORATE.

Public Health Report

FOR THE YEAR 1913.

PUBLIC HEALTH DEPARTMENT REPORT FOR 1913.

CONTENTS.

The page numbers are those of the Medical and Sanitary Report of the Zanzibar Protectorate for the year 1913.

PART I. GENERAL—

	PAGE
1. Progress in Sanitation	21
2. Organization of the Department (Table 1)	22
3. Staff	23
4. Sanitary Law	23
5. Town Planning and Improvement	24
6. Lunacy	25
7. Opium	25

PART II. STATISTICAL—

1. Population	28
2. Births (Tables 2 and 3)	28
3. Deaths (Tables 4, 5, 6, 7, 8 and 9)	30
4. Infantile Mortality	34
5. Meteorology and Climate (Table 10)	34

PART III. PREVALENCE OF INFECTIOUS AND OTHER DISEASES—

1. Plague	36
(*a*) Inoculation	36
(*b*) Rat Work in relation to Plague (Tables 11, 12, 13 and 14)	36
(*c*) Fleas in relation to Rat Plague	38
2. Small-pox (Table 15)	39
Vaccination (Table 16)	39
3. Tuberculosis (Table 17)	40
4. Cerebro-Spinal Meningitis	41
5. Mosquito-borne Diseases	41
(*a*) Dengue Fever	41
(*b*) Filariasis	41
(*c*) Malaria (Tables 18, 19 and 20)	42
(1) General	42
(2) Malaria at Ziwani	43
(3) Anti-Malarial Measures	43
(4) Anti-Mosquito Work (Table 21)	44
(5) Breeding Places of Mosquitoes in Town (Tables 22 and 23)	45
6. Leprosy (Table 24)	47
7. The Poor House (Table 25)	48
8. Pellagra	49

PART IV. DIVISIONAL REPORTS— PAGE

1. Bacteriological (Table 26) 50
2. Port Medical Service (Table 27) 52
3. Town Sanitation 52
4. Veterinary Service (Tables 28, 29 and 30) 53
5. Prevention of Infectious Diseases (Table 31) 56
    (*a*) Gulioni Hospital 56
    (*b*) Quarantine Station (Table 32) 57
6. Pemba (Tables 35, 36, 37, 38, 39, 40 and 41) 58

PART V. SPECIAL REPORTS—

1. Medical Inspection of School Children (Tables 42 and 43) 63
2. Beri-beri in Zanzibar (Tables 44, 45 and 46) 66
3. Some notes on the Geology of Zanzibar 69
4. A Note on Dengue Fever and Filariasis 71

PUBLIC HEALTH DEPARTMENT REPORT FOR 1913.

PART I. (GENERAL).

1. PROGRESS IN SANITATION.

The suggestion is ventured that the work of the Public Health Department has grown or expanded considerably during the past few years. This may be looked upon as a healthy sign, rather than as an indication that disease is more prevalent.

As the education of any community improves in matters of sanitation and hygiene, so will a Health Department find that more and more work is put on to its shoulders. A primitive population is content to throw out upon the streets its refuse, and, what is more, is by no means averse to allowing it to be left there. This was the case in Zanzibar not so many years ago, whilst travellers, who passed through the town in the mid-Victorian era, all dwelt on the appallingly insanitary condition of the place.

Dirt, filth and rubbish of all kinds was flung on the streets, and if one went out of one's house, one was compelled to wade through a dreadful mess. Dead bodies were cast out on the beach in many instances, or, if the corpse were fortunate enough to be buried, the grave was dug anywhere in the town, whilst the richer and more important persons were buried in their own back gardens, so to speak. Slowly but surely, however, sanitary education has progressed among all classes of the native community, and although at the present time the standard is still very considerably below what is desirable, yet it is improving year by year.

Complaints now come into the Health Office daily as to insanitary conditions in various parts of the town, with requests from Indians, and in some cases from Native Africans, to have the matter put right.

This, I think, is a very hopeful sign, and I do all I can to encourage the practice.

The extension of education and the habits learnt in the Government School must tell in the long run. Whilst on this subject, I should like to see the senior boys in the Government School actually receive instruction in elementary hygiene. No one can deny that even a slight knowledge of the principles of sanitation is just as valuable as a deep knowledge of arithmetic.

The contention then is this, that any increase in the work of a Public Health Department is fundamentally a sign of improving health conditions, rather than of an increased prevalence of disease.

2. ORGANISATION OF THE DEPARTMENT.

As a public department grows, unless its actual internal economy is properly and efficiently organised, with definite channels and chains of responsibility, it is liable to become unwieldy ; follows a time of emergency, and the machinery of its organisation will break down, unless each division understands its duties and its responsibilities and adheres to them.

In order, therefore, to enable the organisation of the Public Health Department to be seen at a glance, the attached scheme has been prepared. From this diagram, the chain of responsibility is clearly indicated. It will be seen that the total number of employés in the Public Health Department for the year 1913 was 360, whilst of these only four were employed in purely administrative work, the remaining 356 being actually occupied with executive duties.

TABLE I.

HEALTH OFFICER.

- (1) ASSISTANT HEALTH OFFICER'S DIVISION.
  - (*a*) Bacteriological Dept.
    - 1 laboratory assistant
    - 1 general duty man
  - (*b*) Port Medical Service.
    - 1 sub. asst. surgeon (dhow inspector)
    - 5 boat boys
- (2) RESEARCH DIVISION.
  - 1 economic zoologist
  - 2 general duty men
- (3) VETERINARY DIVISION.
  - (*a*) Cattle Quarantine Station.
    - 1 veterinary officer
    - 5 general duty men
  - (*b*) Slaughter-house and Hospital.
    - 1 headman
    - 6 sweepers
    - 2 general duty men
- (4) CHIEF SANITARY INSPECTOR'S DIVISION.
  - (*a*) Town Sanitation.
    - (1) Conservancy.
      - 5 sub-inspectors
      - 4 Indian overseers
      - 9 headmen
      - 50 sweepers
      - 126 cartmen
    - (2) Disinfection.
      - 15 gangmen
      - 2 cleaners.
  - (*b*) Mosquito Brigade.
    - 5 inspectors
    - 15 general duty men
  - (*c*) Rat Brigade.
    - 1 dissector
    - 7 assistants
  - (*d*) Markets.
    - 1 headman
    - 6 sweepers
  - (*e*) Public Graveyards.
    - 3 general duty men
  - (*f*) Dhoby Station.
    - 3 general duty men
- (5) PREVENTION OF INFECTIOUS DISEASES DIVISION.
  - (*a*) Prison Island Quarantine Station.
    - 1 superintendent
    - 10 attendants
  - (*b*) Infectious Diseases Hospital.
    - 1 hospital assistant
    - 5 attendants
  - (*c*) Vaccination and Inoculation.
    - 1 chief inoculator
    - 3 assistants
  - (*d*) Leper Asylum and Poor House.
- (6) CLERICAL DIVISION.
  - (*a*) Finance.
    - 1 head clerk
  - (*b*) Stores.
    - 1 storekeeper
    - 1 carpenter
    - 1 mason
    - 1 caretaker
    - 3 general duty men
  - (*c*) Statistical Dept.
    - 1 clerk
    - 1 examiner of the dead
    - 1 Indian reporter of births
    - 1 messenger
    - 1 office boy
- (7) SUBURBAN SANITATION DIVISION.
  - 2 sub-inspectors
  - 12 general duty men
- (8) PEMBA DIVISION.
  - Medical Officer of Health.
    - CHAKE.
      - 1 chief inspector
      - 1 overseer
      - 1 headman
      - 12 general duty men
    - WETI.
      - 1 sub-inspector
      - 1 overseer
      - 1 headman
      - 15 general duty men
    - MKOANI.
      - 1 sub-inspector
      - 5 general duty men
    - LEPER AND POOR SETTLEMENTS.
      - 3 attendants.
- (9) SCHOOL MEDICAL SERVICE.

3. STAFF AND SENIOR ASSISTANTS.

(1) *Administrative Branch.*

Health Officer	Major D. S. Skelton, R.A.M.C.,M.R.C.S., (Eng.),L.R.C.P.(Lond.), D.P.H. (Lond.)
Finance, Chief Clerk	Mr. Chunilal Majmudar.
Store Inspector	Mr. Lalchand Bhaichand.
Statistical Clerk	Mr. J. M. Noronha.

(2) *Executive Branch.*

Assistant Health Officer and Bacteriologist	Dr. A. G. Carment, M.D., B.Sc. (Edin.)
Economic Zoologist	Dr. W. M. Aders, Ph.D.
Health Officer, Pemba	Dr A. P. Watkins, M.A. (Cantab.), M.R.C.S. (Eng.), L.R.C.P. (Lond.)
Veterinary Officer	Mr. J. A. N. da Cunha.
Infectious Diseases Hospital	Sub-Assistant Surgeon Durgadas Soni.
Chief Inoculator	Sub-Assistant Surgeon F. Paul.
Chief Sanitary Inspector	Mr. F. de Souza, M.S.I.
Chief Sanitary Inspector, Pemba	Mr. Gohel.
Superintendent, Quarantine Station	Mr. I. C. Fernandes.

4. SANITARY LAW.

With the exception of the Dairies Decree no legislation affecting this Department directly has come into force during the past year.

The Dairies Decree, No. 5 of 1913, is, however, a very important measure. Practically speaking, it embodies the main provisions of the "Pure Milk Bill," which has not yet come into force in Great Britain. It gives the Health Officer great powers of supervision over owners of dairies, cowsheds and milk shops. In the first place, owners of dairies, etc., must be licensed. Before receiving a licence, the premises and the conditions under which the trade is conducted must come up to a certain standard, not only structurally, but as regards the general cleanliness of the place and the drainage of the building. The provision of a pure water supply, the means of cleansing and the cleanliness of milk vessels, and the precautions that are taken in connection with the distribution and storage of the milk in order to prevent its exposure to contamination or infection are all considered before a recommendation for a licence is issued. A milk standard, and a fair one at that, is laid down in the decree.

A feature of the decree is that the First Minister is given powers to make, alter or revoke any rule which he may deem necessary.

The only trouble that has been experienced up to the present time was in the case of a certain owner who objected to some of his animals, suspected to be tubercular, being removed from his cowshed to the Health Office premises for the purpose of being tested by tuberculin. The law on the subject is rather vague, and I am of opinion that a regulation might be added, which definitely compels owners of milch cows to submit their animals to the tuberculin test, whenever it may be considered necessary by the veterinary authority.

At present, I am rather bound to consider, if a dairy owner refuses to allow me to test his cattle, that I have not been allowed to "thoroughly inspect" the animals, and that in those circumstances I am not justified in recommending the District Officer to issue a licence. It may be, however, that not all Magistrates will see eye to eye with the Health Officer on this point.

Taken all round from the point of view of this Department, the Dairies Decree is a very useful and important piece of legislation.

5. TOWN PLANNING AND IMPROVEMENT.

No very striking work has been put in hand, although a lot of quiet and exceedingly useful work has been done in cleaning up and clearing away ruins by the Public Works Department. To "town-plan" in an old city like Zanzibar is one of the most difficult problems that can be found. It is a problem, too, which is dependent on the prevailing financial conditions, because it involves the demolition of buildings and the acquirement of land which may not belong to Government. It is almost as expensive as swamp drainage and, in its way, it is just as important.

It occurs to me, then, that in regard to Town Planning the leading points, which have to be kept in view, are these :—

(A) No makuti hut, or rather no hut built in the native fashion, that is without any sort of proper lighting or ventilation and with its "choos" in the back kitchen, shall be allowed to remain within certain areas of the township. Why? Because these dark houses are the hiding places and reservoirs of all sorts of mosquitoes, whilst the cess-pits inside them are found to be the breeding places of both culex and stegomyia. I invite you to turn to Dr. Howard's interesting paper on page 72, where it is shown that at least 1 in 5 of the patients admitted to the Mission Hospital of Zanzibar is infected with micro-filaria, a blood disease, which is carried by the *Culex fatigans.* The *Culex fatigans* is most commonly found breeding in cess-pits. This fact is brought out clearly in my analysis of the work of the Mosquito-Brigade. The *Filaria bancrofti* is the cause of elephantiasis, a disease to which I drew your attention in my last Annual Report as being so lamentably common in Zanzibar.

Therefore these native huts, where they exist, as they do, near European and respectable Indian houses must be removed. They cannot all be demolished at once, or in one year, but steady progress in this matter must, I urge, be maintained.

The areas that demand more immediate attention are :—

(*a*) that one near Mr. Mead's house, where there is a collection of some 15 native huts within a very few yards of a good European residential quarter ;

(*b*) that one at the back of Mr. Swinerd's house ;

(*c*) that one between the Health Office and the creek. When cleared, levelled and drained this would make an excellent building site. As it is, every one of these huts is a breeding place and a reservoir for mosquitoes, which sooner or later find their way to the European quarter of the town.

(*d*) Finally, there is a piece of land near the creek west of Darajani Bridge, which was condemned by Prof. Simpson at sight as an insanitary area. At present it is occupied by two or three "Lairies," some potters and a firm of lime burners. The houses surrounding it are, in general, in a very dilapidated and tumble-down condition.

It may also be mentioned that this area appears to be the focus of the plague-infected rats, a fact which affords an additional reason for the clearance of this part of the town.

Besides that, it would most certainly prove a valuable building plot, being, as it is, near the markets, creek, and the railway. The money spent on improving it would, I am convinced, be recovered by the rise in the site value, which must follow any comprehensive improvement scheme.

(B) Regard must be paid to the width of new streets. Ideally of course existing streets, wherever it is possible, should be widened by compelling owners, who are reconstructing dwellings or any sort of building, to set back the new structure such a distance as shall give the street a standard width somewhere between 40 and 50 feet, but this is an impossible figure to suggest for the more crowded business quarters of the town. As matters are at present, a street in Zanzibar is fairly wide, if it is anything beween 15 and 20 feet across. If new houses fronting on a main street or bazaar can be set back so that the street is 25 feet wide, then a great deal will have been done.

Here again, the Government will have to pay compensation to the owner, but such compensation should not by rights mount to a high figure, as the whole population, as well as the owner, reaps the benefit by having more light, air and ventilation.

In addition to this, Prof. Simpson in his "Tropical Hygiene," lays down the following guide, "that the houses constituting each section of a block shall have at their rear a lane not less than 15 feet and not more than 20 feet wide for the purposes of scavenging and drainage. That the houses fronting the main street shall have at their rear an open space between them and the boundary wall of the lane. That in the centre of the town, in the business quarter not more than two-thirds of the house site within each boundary wall shall be covered, and not less than one-third remain uncovered; and in the outer and residential ring of the town, that no more than one-half of the house site shall be covered."

The Director of Public Works has been so considerate since he has been in charge of the Department as to forward plans of new buildings for my inspection, and has asked me to make such remarks on them from the point of view of sanitation as I consider necessary. It may be noted that the types of houses proposed by the local Indian architects are in general bad. Their idea appears to be anchored to a scheme of building a kind of doll's house three rooms deep. The central room has no light or ventilation, except through the other two ; and as regards the ground floor, the front room is usually the shop and is therefore closed at night. The excuse always made by the builder is that the middle room is meant as a store room and not as a living room. But even if that plan is adhered to, the result is almost as bad as if the room were used as a living or a sleeping apartment, because, if it is used as a store, it soon becomes rat ridden and flea infested, and, if as a sleeping or a living room, it is usually indescribably dirty, filthy and stuffy.

As to huts. Firstly they should be aligned properly, none should be higher than 16 feet and the roadway between them should be at least 20 feet wide, and further there should be a space between each hut of about 9 feet. Behind each there should be a space as deep at least as the hut is high, in which should be the "choo." At present the "choo" as often as not is in the house itself and very often the apartment is used as a sort of back kitchen.

To go on allowing huts to be built as we are doing, or perhaps it should be said to the credit of the Public Works and Health Departments, as used to be allowed till quite recently, is simply to ask that the general hygienic condition of the poorer classes of the community shall be kept at its present low level. For instance, to give only one reason for bringing the above points to your notice, it will be seen on examination of the number of deaths that between 1905 and 31st December, 1913, the deaths from plague amounted to 147 only, and to tuberculosis between 1907 and 1913, 1,357. Everything that can possibly be done to stamp out plague is done, but no one pays much attention to tubercle. If you, Sir, agree to consider tuberculosis as being fostered by the absence of light and air, then it behoves the Executive to give this housing, building and town planning question very serious consideration.

Having in view, then, the requirements mentioned above, it would seem that some addition to the schedule under the Building Decree No. 2 of 1909 may be found necessary, and regulations, framed more or less after the style of those recently introduced into British East Africa under the advice of Prof. Simpson, should be incorporated in it. It is true that, under the principal decree, the first British Resident Minister has very wide powers of refusal on various grounds, but on the other hand, as so often happens, what may appear insanitary and ill-advised to the sanitary expert, is not always regarded in the same light by non-expert opinion.

In these circumstances, it would be as well perhaps for builders to have laid down for their guidance certain definite rules, if only on account of the frequency with which so-called experts have different views. An instance of this occurred during the past year. Plans of a new dwelling house were disapproved of by the Acting Health Officer, were modified by the Consulting Health Officer, only to be condemned by me on my return to duty. Small wonder that the builder thought himself somewhat aggrieved.

6. LUNACY.

Although this, perhaps, is a matter which hardly comes under the cognisance of the Public Health Department in ordinary circumstances, yet from time to time, owing to the Health Officer being the responsible medical officer to the Poor House, such unfortunates do come directly under Health Office control.

You are aware that, as matters stand at present, no provision whatever is made by the State for the care of pauper lunatics. Until a lunatic commits a criminal act no one bothers about him at all. Once he is convicted he is sent into a so-called asylum or detention house, and there his life is anything but pleasant.

In my view the lunacy problem in this Protectorate can well be considered in combination with the leper question. I understand that on Robbin Island, the well-known leper settlement near Cape Town, there is also a lunatic asylum, and it would seem that if there is any prospect of all the lepers being removed to one place they might be joined by the lunatics and looked after by the one Medical Officer. Arrangements could easily be made to keep the lepers and lunatics separate. It is, from a medical point of view, a matter of no importance, whether a man is a criminal lunatic or a lunatic who has committed no crime. In either case he is a sick person, and if he cannot look after himself it is the duty of the State to do it for him.

7. OPIUM.

A subject to which I desire to call your attention is the problem of the importation and sale of opium for non-medical purposes. It is a matter which has a direct bearing on public health, and, therefore, no apology is made for its introduction at this juncture.

I would remind you that for a variety of reasons efforts are being made in all our Eastern Possessions to suppress the opium habit by all such measures as are locally possible. In Hong Kong, so I am informed, the Government is acquiring the monopoly of preparing the opium imported into the Colony, with a view to raising the price of the drug to a figure prohibitive for general use. In the Straits Settlements and neighbouring possessions I understand that the cost of a licence to sell opium is so high as to be again almost prohibitive. As regards ourselves, I would remind you of the fact that during 1913 1,338 lbs. of opium were imported into Zanzibar, of which amount only 59 lbs. were re-exported.

It may be assumed therefore, that roughly 1,250 lbs. of opium were consumed for non-medical purposes in the Zanzibar Protectorate. The opium habit up to the present is confined, fortunately, so far as my information goes, almost entirely to the Indian population.

The opium imported is apparently sold or distributed by some half a dozen licensees, in spite of the fact, that Sec. 37, Chapter IX., of the Consolidation of

Laws most distinctly lays it down that "no licence under this chapter shall be granted to any person who does not hold a certificate of competency to dispense drugs . . . . . ."

No fee is payable for the licence which is issued.

It is not clear to me in what circumstances these licences to sell opium have been issued. I cannot but think that if a consensus of local medical opinion were taken the verdict would be in favour of the entire prohibition, if possible, of the importation of opium, except strictly for medical purposes, or, failing that, to issue a licence only on payment of an extremely high fee. The withdrawal of the supply would undoubtedly entail a certain amount of suffering on many, but every effort should be made to suppress the habit, whilst the general prospect of the native of Africa acquiring the vice is one to be guarded against at any cost. My own private opinion is that not a few deaths among young children are due directly to opium. Children are extremely susceptible to the action of the drug and a very small dose is sufficient to produce a fatal result. It can be imagined how the Indian parent will give an ailing child a dose of opium to quiet it. The child dies and the diagnosis of a native practitioner, called in at the last moment, is bronchitis or infantile diarrhœa, as the case may be, whereas the real cause of death is poisoning from opium.

NOTE.—Since writing the above the question has come up before the Executive for consideration.—D.S.

PART II.—(STATISTICAL.)

1. POPULATION.

The last census was made in 1910. It was little better than a crude count of the population, and in that respect, therefore, although it may have some importance, yet for scientific purposes it falls very considerably short of what is desired.

In addition to the actual number of persons living at any given date, it is of advantage to know :—

(*i*) the sex.

(*ii*) the age.

(*iii*) the number of persons per inhabited house.

(*iv*) the number of married persons.

(*v*) the number employed in various callings.

Usually a census is made every 10 years, but this is generally recognised to be too prolonged an interval.

In regard to Zanzibar, I suggest that another census be made in the town limits and that the information asked for above be obtained. I should very much like this to be done on the night of the 1st January, 1915.

I think if the three Departments which are mostly concerned with the intimate life of the Township, combined, that is to say, the District Officer, the Police and Health Departments, the information could be got and the results would prove to be fairly reliable.

The expense would be small ; all that would be needed would be a temporary staff of clerks.

A joint committee could elaborate an organisation by which the whole Town could be surveyed within 24 hours.

In a great number of instances the collecting staff would be able to leave the census paper in the house, the head of the family could fill in the simple form in his own language, either Hindustani or Arabic. This, however, is not the place to discuss details, all that is needed here is for me to point out to you that a second census is necessary, that 1915 is an intercensal time, and I am of opinion that the census would be made in one or two nights, if the effort were properly organised. Meantime I can only recall the figures returned at the last census, which was made in 1910, when it was found that the population of both Islands was 197,199, including that of the Town, which was 35,264.

The density of population is calculated at :—

Island of Zanzibar per square mile	175
,, Pemba ,, ,, ...	219

2. BIRTHS.

(*a*) Zanzibar Town.

The following tables show the number, sex and nationality distribution of the births in the Town of Zanzibar during the past year. In parallel is given the number of births for the preceding three years.

The number of births registered in the Town of Zanzibar during the year 1913, was 576

Males...	299	
Females	277	576
Still-born		39

NATIONALITY OF BIRTHS.

TABLE 2.

Nationality.	During				Estimated Birth Rate for 1913 per 1,000.
	1913.	1912.	1911.	1910.	
Swahili...	91	151	207	24	4·4
Arabs	19	17	23	21	5·2
Manyama	7	16	13	1	—
Myamezi	1	3	—	—	—
Nyassa...	6	10	2	—	—
Kavirondo	1	—	—	—	—
Masai	1	—	—	—	—
Barawa	1	—	1	—	—
Somalis	1	1	—	—	—
Gazijas...	22	4	10	—	10·1
Baluchis	7	13	4	5	—
Washihiri	8	27	29	6	—
Ismaili Khojas	117	126	158	176	48·3
Ithnasheri Khojas	61	30			
Memons	34	4	20	35	
Mohamedans (Indian) ...	41	2			
Bohoras	40	19	21	29	
Banyans	80	55	55	53	included in the above.
Turks	1	—	—	—	—
Parsees	3	4	8	7	—
Goans	30	21	19	10	60·0
Europeans (Portg.)	1	5	6	4	—
„ (Germans)... ...	1				
„ (British)	2				
All others	—	10	4	5	—
Total	576	518	580	376	—

On examination of this table one cannot fail to notice the fall in the number of recorded births amongst the Swahilis, and, oddly enough, since 1911 the fall appears to be fairly constant, whilst the Khojas, the Memons, the Banyans, the Bohoras and the Goans appear to be increasing and multiplying. I am by no means sure that the time will not soon arrive when it will be necessary for the Government to offer something in the shape of a "baby bonus" for Swahilis in very much the same way as is done in Australia. Whatever happens to this country its economic future does depend on the maintenance of its indigenous labour supply. It is useless to us to have to look to the Kavirondo and the Kikuyu for our labour. Every man of these tribes is already marked down by British East Africa for its own need. Neither are matters in the least degree improved by any increase in the Indian community, as this class is a trading one, or else its members recruit the skilled labour market, and it is hopeless looking to them for any help in the general labour situation. A survey of Table II. simply emphasises the importance of taking every care of such Swahili children as are brought into the world by doing one's best to improve their conditions of life as regards housing, and the prevention of disease, especially tuberculosis.

(*b*) The total number of registered births for the whole Island of Zanzibar is as follows :—

TABLE 3.

District.	1913.	1912.	1911.	1910.
Town Districts	576	518	580	378
Mkokotoni District	634	580	640	529
Mwera District	253	186	246	273
Chwaka District	287	251	348	387
Total	1,750	1,535	1,814	1,567

The figures for the town, as regards the proportion of boys to girls born, bring out a curious point.

In Great Britain, to every thousand girls there are born 1,040 boys, a disproportion which we may assume is Nature's method of trying to equalise the sexes numerically, having regard to the increased wastage of male life. In spite of Nature, however, the proportion of women to men living in Great Britain is 18 to 17.

Now in Zanzibar we find Nature exerting herself to still greater efforts, because it is seen that to every thousand girls 1,079 boys are born into the world. Yet, in later life, the girls disappear, for the proportion of men to women is 15 to 14.

The average number of births for the Island over a period of 4 years is 1,666·5 per annum.

Taking the mean population to be 114,000, the birth rate is therefore 15·35 per 1,000, against 13·8 for last year.

3. DEATHS.

(*a*) Zanzibar Town.*

The number of deaths registered in town during the year 1913 was amongst:—

Males	510	
Females	512	
		—1,022

Number of deaths in :—

Town proper	398	
N. & S. N'Gambo District	538	
Shambas and nearer Suburbs	84	
Harbour	2	
		—1,022

In addition to these 5 deaths occurred on vessels in port. These have not been included in the death return.

---

* In the following tables account has not been taken of 106 deaths which occurred during the year at the Leper and Poor Asylums, as details as to these arrived too late to be included in this Report.

TABLE 4.

GENERAL CAUSES OF DEATHS.

Diseases.	Males.	Females.	Total.
(*a*) Infectious Diseases.			
Beri-Beri	1	—	1
Dysentery	5	6	11
Erysipelas	1	1	2
Gonorrhœa	3	—	3
Malarial Fever	81	78	159
Measles	—	1	1
Pneumonia	15	5	20
Rheumatic Fever...	28	38	66
Septicæmia	1	2	3
Small-pox	1	1	2
Syphilis secondary	3	—	3
,, Inherited	1	—	1
Tetanus	5	—	5
Tuberculosis	77	67	144
(*b*) General Diseases.			
Anæmia	24	41	65
Debility	52	95	147
Debility Infantile	3	4	7
Diabetes	1	—	1
Leucocythæmia	1	—	1
Rickets	1	—	1
Hypertrophy	1	—	1

TABLE 4.—*continued.*

GENERAL CAUSES OF DEATHS—*continued.*

Diseases.	Males.	Females.	Total.
(*c*) LOCAL DISEASES.			
(1) *Diseases of the Nervous System.*			
Apoplexy	1	—	1
Cerebral Congestion	2	—	2
,, Hæmorrhage	2	2	4
Convulsions Infantile	20	22	42
Dementia	12	21	33
Eclampsia	—	2	2
Epilepsy	4	8	12
Hemiplegia	1	1	2
Hydrocephalus	—	1	1
Paralysis	10	8	18
(2) *Diseases of Circulatory System.*			
Atheroma	1	—	1
Degeneration	—	3	3
Dilatation of heart	1	—	1
Endocarditis	8	4	12
Valvular disease of heart	1	3	4
(3) *Respiratory System.*			
Asthma	7	8	15
Bronchitis	44	36	80
Broncho-pneumonia	14	2	16
(4) *Digestive System.*			
Ascites	2	2	4
Cancer of Liver	1	—	1
Cirrhosis	2	1	3
Diarrhœa	19	19	38
,, Infantile	4	—	4
Hæmorrhage of stomach	2	1	3
Hepatitis	2	1	3
Hernia	2	—	2
,, Strangulated	5	—	5
Jaundice	5	3	8
Peritonitis	—	1	1
Ulceration of stomach	—	1	1
(5) *Urinary System.*			
Bright's Disease	5	1	6
Chronic Cystitis	3	—	3
(6) *Generative System.*			
(Male Organs)			
Elephantiasis of Scrotum	1	—	1
Haematocele	1	—	1
Inflammation of Scrotum	1	—	1
(Female Organs)			
Abortion	—	2	2
Abscess of breast	—	3	3
Puerperal Septicæmia	—	8	8
(7) *Connective Tissue.*			
Abscess	—	1	1
Cellulitis	2	—	2
(8) *Diseases of the Skin.*			
Carbuncle	1	—	1
(9) *Affections connected with Parturition.*			
Premature birth	3	—	3
(*d*) INJURIES.			
Burns	1	2	3
Drowning	1	—	1
Fracture of arm	1	—	1
,, of spine	1	—	1
Starvation	2	2	4
Strangulation	2	—	2
Wound of bone	1	—	1
,, due to stabbing	2	1	3
(*e*) SURGICAL OPERATION.			
Nephrotomy	1	—	1
(*f*) TUMOURS.			
Carcinoma	1	2	3
Sarcoma	1	—	1
(*g*) PARASITES (Nematoda).			
Ankylostomiasis	1	1	2
Filariasis	1	—	1

TABLE 5.

SHOWING THE NATIONALITY OF THE DECEASED.

Nationality.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Swahili	38	40	46	41	53	40	49	57	43	56	54	41	558
Arabs	4	5	5	4	6	4	1	2	3	3	5	4	46
Manyama	1	—	—	—	—	—	1	—	1	—	—	—	3
Myamezi	—	—	—	—	—	—	—	—	—	1	—	—	1
Nyassa	1	—	1	—	—	1	—	2	1	—	—	—	6
Kavirondo	—	—	—	—	—	—	—	—	—	1	2	—	3
Somali	1	1	—	—	2	—	1	—	—	—	—	—	5
Gazija	3	1	1	3	4	3	5	6	2	5	7	7	47
Baluchi	—	—	1	2	1	—	1	1	1	1	2	1	11
Washihiri	3	3	7	7	5	8	7	9	3	6	7	7	72
Ismaili Khojas	5	8	3	4	7	4	9	7	10	8	3	3	71
Ithnasheri Khojas	—	2	1	7	3	3	2	5	1	2	—	7	33
Memons	1	4	3	4	2	3	—	2	2	4	1	—	26
Mohamedan Indians	1	3	2	2	7	10	11	4	2	6	6	6	60
Bohoras	3	—	2	—	1	6	1	—	1	—	1	—	15
Turks	—	2	—	—	—	—	—	—	—	—	1	—	3
Banyans	5	3	7	3	4	3	7	6	3	1	2	2	46
Persians	—	—	—	—	—	—	—	1	—	—	—	—	1
Goans	1	—	1	1	—	—	—	—	1	1	1	2	8
European (German)	—	1	—	—	—	—	—	—	—	—	1	—	2
,, (Italian)	—	—	—	—	—	—	1	—	—	—	—	—	1
,, (French)	—	—	—	—	—	—	—	—	1	—	—	—	1
,, (British)	—	1	—	—	—	—	—	—	—	—	—	—	1
Unknown	—	—	—	1	—	—	—	—	—	—	—	1	2
	67	74	80	79	95	85	96	102	75	95	93	81	1,022

TABLE 6.

SHOWING THE AGE, SEX AND LOCALITY DISTRIBUTION.

Total Deaths, Sex, Deaths in and at Age.	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1. *Total Deaths*	67	74	80	79	95	85	96	102	75	95	93	81	1022
2. *Sex.*													
Males	36	38	46	45	42	36	41	51	31	42	59	43	510
Females	31	36	34	34	53	49	55	51	44	53	34	38	512
3. *Deaths in*—													
Town Proper	29	23	39	33	39	36	40	34	26	29	34	36	398
N. & S. N'Gambo District	34	49	39	40	49	39	45	55	42	54	51	41	538
Shambas nearer Suburbs	4	2	2	6	7	10	11	12	7	12	7	4	84
Harbour	—	—	—	—	—	—	—	1	—	—	1	—	2
4. *Ages.*													
Under 1 year	2	8	9	4	8	5	8	4	6	7	12	8	81
1 to 5 years	7	1	3	3	1	10	6	5	7	4	3	6	56
6 ,, 10 ,,	1	4	3	1	2	7	4	3	1	1	2	3	32
11 ,, 20 ,,	2	2	3	5	8	7	2	7	2	3	1	4	46
21 ,, 30 ,,	9	4	10	8	17	13	19	21	9	14	15	12	151
31 ,, 40 ,,	9	14	10	13	20	16	15	19	21	22	25	23	207
41 ,, 50 ,,	10	14	10	18	10	9	13	19	11	13	15	10	152
51 ,, 60 ,,	9	6	10	13	10	5	11	6	2	9	7	6	94
61 ,, 70 ,,	5	8	11	9	13	2	4	3	4	5	5	1	70
Over 70 ,,	13	13	11	5	6	11	14	15	12	17	8	8	133
Total	67	75	81	81	95	86	96	102	75	95	93	81	1022

(*b*) THE WHOLE ISLAND.

The number of deaths recorded month by month in Zanzibar Town and the outlying districts is shown in the table below :—

TABLE 7.

Month.	Zanzibar Town.	Mkokotoni.	Chwaka.	Mwera.	Total.
January	67	71	25	65	228
February	74	60	18	58	210
March	80	58	20	57	215
April	79	74	40	69	262
May	95	76	23	74	268
June	85	89	43	46	263
July	96	101	33	69	299
August	102	90	37	75	304
September	75	68	24	71	238
October	95	61	18	48	222
November	93	70	18	66	247
December	81	71	29	68	249
Total	1,022	889	328	766	3,005

This figure compares very well with that of other years as is shown below :—

TABLE 8.

Districts.	1913.	1912.	1911.	1910.
Zanzibar Town	1,022	1,284	1,373	1,363
Mkokotoni	889	1,118	1,258	1,029
Chwaka	328	782	459	402
Mwera	766	1,071	740	740
Total	3,005	4,255	3,830	3,534

The crude death rate for the Island of Zanzibar is therefore 26·3 per 1,000 of population, compared with 26·7 for the year 1912.

This reduction in the death rate is to be ascribed in the greatest part to absence of epidemic disease ; at the same time it is a substantial reduction even on the lowest figure recorded previously, viz., that of 1910, when registration was probably not so universally carried out as it is now.

As to the Shamba deaths, as nearly as can be ascertained, the following table shows the principal causes and number of deaths :—

TABLE 9.

Diseases.	Mkokotoni.	Chwaka.	Mwera.	Total.
INFECTIOUS DISEASES.				
Tetanus	2	1	—	3
Tuberculosis	212	73	185	470
Rheumatism	9	2	26	37
GENERAL DISEASES.				
Anæmia	114	14	156	284
Malaria	130	155	200	485
LOCAL DISEASES.				
Nervous System (including dementia.)	14	8	38	60
Urinary System	15	—	22	37
Digestive System	17	31	48	96
Generative System (parturition)	16	5	11	32
ALL OTHER DISEASES.	360	39	80	491
Total	889	328	766	1,983

4. INFANTILE MORTALITY.

The number of deaths under one year of age divided by the number of births multiplied by 1,000 gives an infantile mortality figure which can be compared with that of previous years.

The infantile mortality per 1,000 births in Zanzibar Town during the past 5 years is as follows :—

1913.	1912.	1911.	1910.	1909.
140	193	162	288	399

For comparison with other tropical countries I would call attention to the figures recorded in the Straits Settlements.

1911.	1910.	1909.
158·5	184·7	197·0

In all England in 1912 the infantile mortality figure was 95 per 1,000, but there it fluctuates markedly according to whether the rate is for manufacturing Towns or Agricultural districts.

5. METEOROLOGY AND CLIMATE.

The following figures have been obtained from the observations published by Dr. Charlesworth week by week. From these the monthly averages have been worked out as follows :—

TABLE 10.

Month.	Barometer.	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Total Rainfall.	Prevailing Wind.	Relative Humidity.	Tension of Aqueous Vapour.
January ...	30·076	81·7	76·7	86·7	79·5	0·39	N.N.E.	78	·82
February ...	30·070	83·4	77·4	89·0	80·7	1·37	N.N.E.	75	·81
March ...	30·038	81·4	76·8	86·7	78·3	9·99	Variable	77	·83
April ...	30·070	79·1	75·8	84·1	76·2	17·59	S.S.W.	86	·85
May ...	30·100	78·2	75·1	83·6	76·1	11·18	S.S.W.	86	·77
June ...	30·197	76·4	72·3	83·2	74 5	0·07	S.S.W.	82	·73
July ...	30·233	74·9	70·8	82·5	72·9	0·31	S.S.W.	81	·66
August ...	30·236	75·2	71·1	82·2	72·8	0·88	S.S.W.	81	·70
September	30·197	76·7	72·4	83·2	73·6	2·58	Variable	79	·73
October ...	30 176	78·9	74·1	84·4	75·2	4·22	"	80	·78
November	30·093	81·4	76·0	83·9	78·5	3·20	V. to N.N.E.	77	·83
December	30·086	82·5	76·9	86·0	79·7	1·31	N.N.E.	77	·82
				1015·5	918·0	53·09		959 79·9	

Two of the terms used above require explanation. The elastic force of vapour or the "tension of aqueous vapour" is that amount of barometric pressure which is due to the aqueous vapour in the atmosphere. As the air temperature goes down, and with it the tension of aqueous vapour, a point is at length reached when the air can no longer hold its moisture and dew is deposited.

By relative humidity is meant that amount of moisture in the air expressed as a percentage of the amount just necessary to cause saturation.

In previous Reports of the Public Health Department the only Meteorological figures that have been published have been those of the rainfall. The rainfall has, it is true, a bearing more or less important on the health of the community, but as regards the European element, the two factors, influencing at any rate comfort and health, are the Wet Bulb readings and the air movement. Professor Haldane has shown that the limit of human endurance is reached in still air when the wet bulb reading is between 88 and 90°F. provided that no work is being done. With an air movement at 2 miles an hour the critical temperature is 93°F. wet bulb, but when muscular work is being performed the danger temperature is 80°F.

Now the body temperature after vigorous exercise not infrequently rises from 98·4° to as much as 102 without any ill effects following. At 103° the victim shows all the signs of being "done" and at 104° he stands every chance of going down with heat apoplexy or heat stroke as it is usually called.

It would appear it is only in February that there is any great danger from heat stroke in Zanzibar.

Should the monsoon fail early in February, it behoves all those who play tennis and other vigorous games to desist as soon as the "done up" feeling appears, otherwise the exercise does more harm than good. This condition is technically called "heat exhaustion" by Manson and Sambon.

As a matter of fact looking down the meteorological figures, shown above, one might come to the conclusion that the climatic conditions of Zanzibar taken generally should be by no means unfavourable to Europeans. The rainfall is not very great. There is never an excessively high temperature nor an uncomfortably low one. The relative humidity is high for about two months of the year, but during these months a strong and constant breeze is blowing.

At the same time it must be remembered, as pointed out by Sir Havelock Charles, that sun, light and humidity produce a lowered pulse rate, an irritable heart, a lessened respiratory function, and a deterioration of the blood; a congested liver follows with intestinal toxæmia. There follows a lowered power of resistance and a liability to the specific diseases. And all this is shown, as Sir Havelock Charles puts it, by an officer, who, otherwise in every way a good fellow, has become short tempered, forgetful of names, troubled with sleeplessness, given to feel his work too much for him, disinclined to take responsibility, given to make hills into mountains, procrastinating, susceptible on slight exertion to mental or physical fatigue, and with a loss of all power of concentration. In fact, an irritable man, more or less unequal to his work, though otherwise fairly fit. And the man who can stand up against this, what are his qualities?

Sir Havelock Charles describes quickly, and the picture he draws is as true for Zanzibar as it is meant to be for India. The man wanted is one "with his head well screwed on, an even temper, not over intellectual, one who can take an interest in things around, not unduly introspective . . . . . . capable of bearing exposure to the sun, one who will practise temperance in all things, with self control and commonsense . . . . . ."

In short given those things, no man who spends the best part of his life in Zanzibar, with its apparently not undesirable climate, need come to any great grief on that account.

PART III.—PREVALENCE OF INFECTIOUS AND OTHER DISEASES.

1. PLAGUE.

In spite of the fact that a port so near as Mombasa was plague infected for practically the whole year, and at one time very heavily infected, Zanzibar was so fortunate as to escape until the last day of the year.

On the 30th December, the D.O.A. Line Steamer "Praesident" arrived from Dar-es-Salam bringing a passenger who, on the 31st December, developed symptoms of Bubonic Plague. He was at once removed to the Infectious Diseases Hospital at Gulioni. The disease was confirmed by further microscopical and bacteriological investigations.

(*a*) Inoculation.

The number of persons inoculated against plague during the year was 1,465.

Of these:—

1,262	were	Ismaili Khojas
155	,,	Banyans
21	,,	Baluchis
14	,,	Ihnasheri Khojas
6	,,	Washihiri
4	,,	Swahilis
2	,,	Memons
1	Goan.	
1,465		

(*b*) Rat Work in Relation to Plague.

The systematic examination of rats has been continued during the year.

In regard to the detail, as this was fully explained in the Annual Report for 1912, there is no occasion to go over the same ground again.

The following tables will however show the comparative magnitude of this branch of the work of the Department.

The number of rats destroyed during previous years is as follows:—

1909	60,527
1910	52,136
1911	52,778
1912	64,446
1913	51,174

It is thus seen, that during the past 6 years some 280,000 rats have been destroyed, and as on average the fœtus count amounts to about 25,000 a year, the town has during this period been rid of between four and five hundred thousand rats.

The question at once occurs, is it worth while going on with the campaign?

From the point of view of rat destruction *quâ* destruction I do not think it is. I therefore propose putting into force this year (1914) and continuing for say 5 years the principles introduced by Rodier into Australia for the purpose of destroying rabbits.

Summed up the Rodier System is this: Catch the rats alive and uninjured: kill all the females and liberate the males, keeping a strict tally of the number: the tail of the male is snipped so that if caught again he can be counted out.

The system appears to depend on the fact, that rats have become a pest because they are polygamous, just as rabbits have in Australia. If they become polyandrous they will cease to be a nuisance, because as soon as the number of males exceeds that of the females, the males will persecute the females, and eventually they will worry them to such an extent that the female cannot breed. The male will also kill what young are born. Finally there should practically be no females left and so the pest will cease.

This is what has happened in the case of rabbits.

The plan anyhow is worth trying.

Whilst this plan of campaign is in force our poisoning methods will be continued, as last year no less than 33,700 odd were known to have been poisoned.

To return to the figures submitted; unfortunately rat plague appeared again in the City after having been in abeyance since March, 1911.

Two infected rats were found in June, 1913, three in November and 10 in December.

Whether rat plague has been dormant all these months, or whether an infected rat landed from Mombasa from a dhow cannot be determined. It would appear more likely, that the disease was brought in by dhow and that the rat escaped in spite of the measures of disinfection, which were adopted in the case of dhows arriving from the East African Mainland. The first rat found to be plague infected was brought from the Darajani area near the Creek, and it is up this creek that dhows are brought to be scraped and painted, etc., being beached on the mud for the purpose.

TABLE 11.

RATS COLLECTED AT VARIOUS COLLECTING STATIONS.

Months.	Mwembe Ladu.	Mlandege.	Darajani.	Malindi.	Office.	Total.
January... ...	140	315	773	91	1,465	2,784
February ...	148	408	391	134	1,976	3,057
March	257	553	426	126	2,721	4,083
April	183	743	524	97	2,837	4,384
May	285	726	591	105	3,299	5,006
June	220	656	589	173	3,618	5,256
July	219	688	617	70	3,511	5,105
August	174	602	415	84	3,321	4,596
September ...	167	646	483	71	3,028	4,395
October	219	875	492	42	3,058	4,686
November ...	138	569	270	19	2,991	3,987
December ...	142	366	321	39	2,967	3,835
Total ...	2,292	7,147	5,892	1,051	34,792	51,174

TABLE 12.

DETAILS OF RATS.

Months.	Live rats.	Rats brought dead in traps.	Poisoned rats.	Total.
January	352	632	1,800	2,784
February	321	605	2,131	3,057
March	434	822	2,827	4,083
April	481	944	2,959	4,384
May	600	1,207	3,199	5,006
June	636	1,354	3,266	5,256
July	573	1,119	3,413	5,105
August	479	865	3,252	4,596
September	440	850	3,105	4,395
October	442	1,052	3,192	4,686
November	472	1,148	2,367	3,987
December	436	1,126	2,273	3,835
Total	5,666	11,724	33,784	51,174

TABLE 13.

RETURN SHOWING NUMBER OF MALES AND ALSO FEMALE RATS WITH FŒTUSES RECEIVED DURING 1913.

Months.	Males.	Females.	Total.	No. of pregnant rats.	Fœtuses.
January	690	2,094	2,784	250	1,695
February	901	2,156	3,057	235	1,510
March	1,222	2,861	4,083	300	1,925
April	1,328	3,056	4,384	207	1,324
May	1,632	3,374	5,006	200	1,277
June	1,642	3,614	5,256	189	1,164
July	774	4,331	5,105	174	1,047
August...	1,585	3,011	4,596	186	1,050
September	1,542	2,853	4,395	162	1,001
October	1,626	3,060	4,686	159	947
November	1,318	2,669	3,987	129	809
December	1,098	2,737	3,835	106	626
Total	15,358	35,816	51,174	2,297	14,375

TABLE 14.

VARIETIES OF RATS AND PARTICULARS OF RATS INFECTED WITH RAT PLAGUE.

Months, 1913.	Epimys Norvegicus (Brown rats).		Mus Rattus (Black rats).		Mus Alexandrinus (Gray rats).		Musk Rats.		"Buku."		White Rats.		Total.	
	Number.	Infected.	Number.	Infected.	Number.	Infected.	Number.	Infected.	Number.	Infected.	Number.	Infected.	Rats.	Infected.
January	1,381	—	744	—	530	—	129	—	—	—	—	—	2,784	—
February	1,225	—	920	—	747	—	164	—	1	—	—	—	3,057	—
March	1,679	—	1,209	—	930	—	263	—	2	—	—	—	4,083	—
April	1,832	—	1,222	—	1,080	—	250	—	—	—	—	—	4,384	—
May	1,950	—	1,408	—	1,359	—	289	—	—	—	—	—	5,006	—
June	1,860	1	1,549	1	1,516	—	331	—	—	—	—	—	5,256	2
July	1,836	—	1,441	—	1,566	—	258	—	4	—	—	—	5,105	—
August	1,686	—	1,328	—	1,341	—	239	—	2	—	—	—	4,596	—
September	1,518	—	1,289	—	1,334	—	253	—	1	—	—	—	4,395	—
October	1,728	—	1,361	—	1,377	—	218	—	2	—	—	—	4,686	—
November	1,491	1	1,189	—	1,146	2	161	—	—	—	—	—	3,987	3
December	1,615	5	1,146	1	959	3	115	1	—	—	—	—	3,835	10
	19,801	7	14,806	2	13,885	5	2,670	1	12	—	—	—	51,174	15

(*c*) Fleas in Relation to Rat Plague.

As the intermediary between the plague rat and man is the flea, it becomes of importance, that we should know all that can be found out about the vector in any campaign against the disease. A great many observations under this heading have been made in various parts of the world and it was decided that we should endeavour to follow up some of the work that has been done.

We require to know (1)the variety or varieties of fleas carried by the various species of local rat (2) the number of fleas carried by the rat and (3) the sex proportion. Now strictly speaking these observations should be made daily, but there is not the staff available in the laboratories for carrying out such a thorough line of research. It has therefore been decided that 15 rats (*i.e.*, 5 of each species) shall be thoroughly examined once a month.

Dr. Aders has very kindly consented to undertake this and the results he is obtaining are already of considerable interest. They will be published next year.

2. SMALL POX.

Like the poor, this disease seems always to be with us year by year. Although the Town on occasions goes for months without a case being notified, yet ever since 1909 there has always been a series to report.

The outbreak in 1913 was curiously localised, the majority of the cases coming from the neighbourhood of Mkunazini and the Sokomohogo.

The first case occurred on 4th January and the last on the 5th February.

The measures taken were :—

1. Removal of the case with the house contacts to Gulioni Hospital, unless some very special reason could be shown against this measure, as for instance if a community Banda were available in the suburbs.
2. Immediate vaccination of all house contacts.
3. House to house visits in the neighbourhood of the dwelling in which the case had occurred.
4. Disinfection of the infected house.

The total number of cases was 22.

The type of the disease was milder than in former years and the mortality rate a great deal lower for some reason or other.

The case incidence as compared with that of former years was as follows :—

TABLE 15.

1913.				1912.				1911.				1910.				1909.			
Cases.	Recovered.	Died.	Case mortality per cent.	Cases.	Recovered.	Died.	Case mortality per cent.	Cases.	Recovered.	Died.	Case mortality per cent.	Cases.	Recovered.	Died.	Case mortality per cent.	Cases.	Recovered.	Died.	Case mortality per cent.
22	20	2	0·9	20	15	2	25·0	59	27	32	54·2	244	110	134	54·9	1	1	—	—

In 1913 both the fatal cases were in children under five years of age and neither had been previously vaccinated.

VACCINATION.

The number of persons vaccinated against Small-pox during the year is as follows :—

Zanzibar Town	11,164
Mkokotoni District	3,620
Chwaka District	95
	14,879

From the subjoined table it will be seen that of the results we know of only three in five were successfully vaccinated, whereas in 1912 the failures only amounted to one in 30.

A possible explanation of the large number of failures is that a very high proportion of the people vaccinated nowadays have already been vaccinated once before, but I think besides that, the strain of lymph we were using was not as good as in former years.

TABLE 16.

SHOWING THE NUMBER OF PERSONS VACCINATED, THEIR NATIONALITY AND THE RESULT DURING THE YEAR 1913.

	European.	Indian.	Arab.	Swahili.	Gazija.	Somali.	Shihiri.	Positive.	Negative.	Total.
January	6	736	104	859	113	91	24	1,159	774	1,933
February	—	62	77	275	17	18	13	277	185	462
March	—	128	103	277	39	36	120	406	297	703
April	—	337	92	274	3	8	283	579	417	996
May	—	192	116	423	72	46	62	531	381	912
June	—	149	53	238	56	—	13	297	312	509
July	—	101	69	459	25	—	4	388	270	658
August	—	61	50	1,345	7	—	4	Clove pickers	No returns available.	1,467
September	—	96	265	1,806	103	2	20			2,292
October	—	50	25	300	65	20	9			469
November	—	100	25	250	250	10	9			419
December	—	50	66	150	18	30	30			344
	6	2,062	1,045	6,656	543	261	591	3,637	2,636	11,164

3. TUBERCULOSIS.

The following table shows the number, the sex, age and nationality distribution of the 144 cases of tuberculosis registered in the town of Zanzibar during 1913.

TABLE 17.

Total deaths, Sex, Age and Nationality.	Jan.	Feb.	Mar.	Apri.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL.
1. *Total deaths*	9	6	2	4	7	16	20	27	9	13	18	13	144
2. *Sex.*													
Males	4	3	1	2	4	7	14	16	3	3	10	6	77
Females	5	3	1	2	3	9	6	11	6	6	8	7	67
3. *Age.*													
Under 1 year	—	—	—	1	—	—	—	—	—	—	—	—	1
1 to 5 years	1	—	—	—	—	—	1	—	—	—	—	—	2
6 ,, 10 ,, ...	—	—	—	—	1	1	—	1	—	—	—	3	6
11 ,, 20 ,, ...	1	2	—	—	—	3	—	2	—	—	1	1	10
21 ,, 30 ,, ...	4	1	—	1	2	5	4	8	2	5	4	2	38
31 ,, 40 ,, ...	1	—	—	2	3	4	6	7	5	3	11	5	47
41 ., 50 ,, ...	2	1	1	—	1	2	4	7	2	2	2	1	25
51 ,, 60 ,, ...	—	1	1	—	—	1	3	2	—	3	—	1	12
61 ,, 70 ,, ...	—	1	—	—	—	—	1	—	—	—	—	—	2
Over 70 ,, ...	—	---	—	—	—	—	1	—	—	—	—	—	1
4. *Nationality.*													
Swahili	3	2	1	—	3	8	8	17	5	8	11	6	72
Arabs	1	—	—	—	2	1	—	—	3	1	1	1	10
Gazijas	—	—	—	—	—	1	2	—	—	—	1	3	7
Washihiri	1	—	—	—	1	3	4	3	—	1	4	1	18
Ismaili Khojas	1	2	1	—	—	—	1	2	—	1	—	—	8
Ithnasheri Khojas ...	—	1	—	3	—	1	—	—	—	—	—	1	6
Memons	—	1	—	1	—	—	—	2	—	1	—	—	5
Bohoras	1	—	—	—	—	—	—	—	—	—	—	—	1
Mohamedan Indian ...	1	—	—	—	1	2	3	—	1	—	1	1	10
Banyans	1	—	—	—	—	—	1	3	—	1	—	—	6
Europeans (It.)	—	—	—	—	—	—	1	—	—	—	—	—	1

The deaths from Tuberculosis registered year by year have been—

In 1907	176
„ 1908	198
„ 1909	183
„ 1910	235
„ 1911	216
„ 1912	205
„ 1913	144

so that there has been a very marked falling off during the past year.

4. CEREBRO-SPINAL MENINGITIS.

A very severe epidemic of this disease has been prevalent among the Akikuyu in the Highlands of East Africa for some time past. It was of great importance that the disease should not be introduced to these Islands, as the whole labour supply for the gathering of the clove crop might have been disorganised. A period of 14 days quarantine was therefore insisted on in the case of Akikuyu coming from Nairobi.

In point of fact, as the result of the experience I gained in Mombasa, I am not convinced that cerebro-spinal fever is a disease which can flourish at the temperature we get at Zanzibar. It is true that a few years ago a severe epidemic was reported from the Gold Coast and this was used as an argument against my view, but when I read the Official Report on the Gold Coast outbreak, I found that it was limited to the Northern Territories, a plateau of the hinterland of the Gold Coast with an altitude of 1,500-2,000 feet, a very different affair to the jungle land and swamp and heat of the Coast belt.

One case of cerebro-spinal meningitis was however admitted to the Government Hospital. He was a patient landed from a B.I. Steamer. Gram negative diplococci were found post mortem in the cerebro-spinal fluid drawn off by lumbar puncture. How he acquired the disease is not known.

5. MOSQUITO-BORNE DISEASES.

Under this heading are included Dengue Fever, Filariasis and Malaria.

(*a*) Dengue Fever.

In regard to this disease six cases were reported in the Tropical Diseases Research Fund Report for 1912, as having occurred in Zanzibar. This elicited a request from the Secretary of the Board for fuller information which unfortunately I was unable at the time to supply.

As the question of Dengue Fever existing in Zanzibar is one of importance and that not only from a purely scientific point of view, I have asked Dr. Howard, who reported the cases, to write a short note on the outbreak, so that its history may be on permanent record. Dr. Howard's notes appear on page 71 under the "Special Reports" Section. Dengue is an interesting disease as far as these Islands are concerned, because it may be recalled that a regular pandemic of Dengue originated at Zanzibar in 1871-3, which spread to the Arabian and Indian coasts and also affected the East Indies and Southern China.

Probably except for Yellow Fever in the olden days, there is nothing like an epidemic of Dengue for spreading widely and rapidly. 80 per cent. of the population goes down with the disease very rapidly. I personally have passed through an epidemic in Trincomali in Ceylon, where practically the whole station acquired the disease. This local outbreak was part of the 1902 pandemic, when the work of the Madras Hospital practically came to a standstill owing to the whole staff going down with the disease.

(*b*) Filariasis.

Dr. Howard also contributes a short note of much interest on this disease, to which I beg to draw your attention.

In respect to this disease the pity of it all is, that it is so easily preventable. The causal organism is carried by a mosquito, the *Culex fatigans*, whose common breeding places you will see from Table 22, on page 46.

If we could only close all the cess-pits and "choos" in the town, we could practically rid Zanzibar of *Culex fatigans*, in which case filariasis would come to an end. But this cannot be done, for, as matters stand at present, cess-pits must continue, and as long as we have cess-pits so long shall we have filariasis and its sequelæ.

It is quite out of the question to oil some 3,000 or 4,000 cess-pits in the native African part of the town at regular intervals.

(*c*) Malaria.

(1) INCIDENCE OF THE DISEASE.

As regards the Town the past year has by no means been a very malarious one, as is shown in the following table :—

TABLE 18.

DEATHS DUE TO MALARIA.

Months.	1913.	1912.	1911.	1910.	1909.	1908.	1907.	Average for 7 Years.
January	7	12	4	16	11	19	11	11·2
February	18	12	11	17	9	11	9	12·2
March	14	20	7	20	15	11	8	13·5
April	24	14	12	19	13	18	9	15·5
May	20	14	11	13	6	25	16	15·0
June	24	15	28	17	5	24	21	19·1
July	13	17	34	29	10	30	19	21·7
August	11	19	26	10	8	22	15	15·8
September	7	12	13	20	12	13	27	13·0
October	9	12	22	17	10	13	27	15·7
November	8	12	11	13	14	6	27	13·0
December	4	12	10	12	10	8	17	10·4
Total	159	171	189	203	123	200	208	17·7

TABLE 19.

SHOWING THE TOTAL DEATHS, SEX, AGE AND NATIONALITY DISTRIBUTION FROM MALARIAL FEVER IN ZANZIBAR TOWN.

Total deaths, age, sex and Nationality.	Jan.	Feb.	Mar.	Aprl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1. Total Deaths	7	18	14	24	20	24	13	11	7	9	8	4	159
2. Sex—													
Males	5	11	7	12	8	10	6	7	4	3	5	3	81
Females	2	7	7	12	12	14	7	4	3	6	3	1	78
3. Age—													
Under 1 year	—	4	2	1	1	—	—	1	—	—	—	1	10
1 to 5 years	2	1	2	2	1	3	1	2	2	1	1	—	18
6 „ 10 „	—	2	—	—	1	5	2	1	—	1	1	—	13
11 „ 20 „	1	1	1	1	2	4	1	1	—	—	—	—	12
21 „ 30 „	2	1	2	1	5	5	3	—	1	2	2	1	25
31 „ 40 „	1	2	—	6	5	3	1	3	2	3	—	1	27
41 „ 50 „	1	4	—	5	2	2	1	2	—	—	1	—	18
51 „ 60 „	—	1	3	4	3	—	1	1	1	2	2	1	19
61 „ 70 „	—	2	3	3	—	2	2	—	1	—	1	—	14
Over 70 years	—	—	1	1	—	—	1	—	—	—	—	—	3
4. Nationality—													
Swahili	4	6	9	13	11	9	8	5	3	6	1	1	76
Arabs	1	1	—	—	—	—	—	—	—	1	1	—	4
Gazijas	—	1	—	1	1	—	—	2	—	—	2	—	7
Somalis	—	1	—	—	—	—	—	—	—	—	—	—	1
Baluchis	—	—	—	1	—	—	—	—	—	—	1	—	2
Washiri	—	—	1	6	1	3	2	2	2	—	—	1	18
Ismaili Khojas	—	4	1	1	2	1	—	—	1	1	1	—	12
Ihnasheri Khojas	—	1	—	1	—	—	—	1	—	—	—	1	4
Memons	—	1	—	—	—	—	—	—	1	1	—	—	3
Bohoras	—	—	1	—	1	1	—	—	—	—	1	—	4
Mohamedan Indians ...	—	1	1	1	2	4	2	1	—	—	1	1	14
Banyans	2	1	1	—	2	6	1	—	—	—	—	—	13
Europeans (German) ...	—	1	—	—	—	—	—	—	—	—	—	—	1

2. PREVALENCE OF MALARIA AT ZIWANI BARRACKS.

Practically speaking the barracks are surrounded by swamps and from the list given elsewhere showing the frequency with which anophelines are found breeding no surprise will be occasioned at the following table, which gives the malarial history since November, 1909, of the Officers of the K.A.R. who have been stationed in Zanzibar. I am indebted to Captain Whish, O.C. Detachment K.A.R. for the information.

TABLE 20.

MALARIAL HISTORY AT ZIWANI BARRACKS.

No.	Names.	Length of Residence at Ziwani.	Remarks as to Malarial Attacks, etc.
1	Capt. B.	—	No record, lived in town.
2	Capt. B.	5 months	One attack.
3	Capt. B.	5 ,,	No record.
4	Capt. D.	9 ,,	,, ,, lived in town.
5	Lieut. S.	9 ,,	Suffered much, invalided to Durban.
6	Lieut. C. B.	9 ,,	Had fever.
7	Lieut. H. de C.	9 ,,	No record, lived in town.
8	Capt. J. W.	3 ,,	No fever.
9	Major L. W.	6 ,,	Three attacks.
10	Capt. R. B.	7 ,,	No fever.
11	Lieut. M.	7 ,,	One attack.
12	Lieut. L.	7 ,,	Two attacks.
13	Sergt.-Major D.	7 ,,	Now and then.
14	Capt. K.	2 ,,	No fever.
15	Lieut. R. B.	—	Nearly every month.
16	Capt. S.	6 ,,	No fever.
17	Lieut. V.	6 ,,	Nearly every month.
18	Lieut. B.	6 ,,	Two attacks, invalided to England.
19	Lieut. M.	6 ,,	Frequent attacks, invalided to England.
20	Major M.	—	After third attack advised to live in town.
21	Lieut. A. T.	18 ,,	Nearly every month.
22	Capt. J. W.	—	No fever, lived in town.
23	Lieut. R. Y.	3 ,,	Nearly every month.
24	Mrs. Y.	3 ,,	Two severe attacks, advised to live in town.
25	S.A.S. J.	—	In hospital every year with fever.
26	Mrs. J.	—	Ill 11 months out of 18, sent to India.

3. ANTI-MALARIAL MEASURES.

(*a*) *Quinine Prophylaxis.*—Efforts are made to try and induce all officials to take quinine regularly during the unhealthy months. During March, April, May, June and July quinine is distributed gratis to all Government officials. A Health Office Subordinate goes round the Government Offices during the above mentioned months on the Monday and Tuesday of each week, and it is his duty to see that all clerks and subordinates get 10 grains of quinine on these two days, whether they like it or not. Those who refuse to take quinine have been given to understand that they are liable to receive no pay if they are absent from duty on account of an attack of malarial fever.

The children in the Government schools are also given quinine twice a week in the form of the tannate made up with a chocolate coating in doses suitable to their age.

A certain amount of sulphate of quinine in powder was sent to the Assistant District Officer at Mwera for distribution to the Masheha, who were instructed in the use of the drug. After a time the remedy became quite popular and the Masheha experienced no difficulty in disposing of their stock at a standard price of one pice per packet of five grains.

Government spent, during the year, Rs.530 on quinine, and received on account of sales Rs.13 odd.

I propose asking to be allowed to extend the trial of the one pice packet to the other District Officers.

(*b*) *Kerosine Oil.*—In general an attempt is made to apply kerosine oil to collections of water with a view of preventing larvæ breeding out. Where there are ditches holding water, automatic oilers are employed, either by drip cans or by a ball of rags soaked in kerosine.

(*c*) *Millions Fish.*—(*Haplochilus playfairii*) have been distributed in ponds, fountains, mosque tanks and other places where water is kept permanently, and the results are extremely satisfactory.

Experiments are still being made to see if this fish will survive in swamps, or whether they become exterminated by fish-eating birds, etc. At present I am not in a position to make any pronouncement on this matter.

4. ANTI-MOSQUITO WORK.

Sanction was obtained early in 1913 for the organisation of an anti-mosquito brigade on a larger scale than funds had hitherto permitted. This formally came into being on 7th March and the way the brigade works is as follows:—

The whole town, west of the tidal creek is divided into four quarters. Each quarter is put in charge of a sub-inspector, whose duty is it to visit every house, garden, ruin and compound in his district one day in each week, on the same day of the week and as nearly as possible at the same hour of the same day. This is so that the weekly visit may be looked for by the householder and that he may be in. It is of no avail for any persons to pretend that they are out, for the house is invariably visited again. Each sub-inspector has under him three Swahili "boys." Two of these carry a light ladder and the other a large tin of kerosine oil and a common garden watering pot. On arrival at a house the sub-inspector asks leave to enter. It must be mentioned that each inspector carries a written order from the Health Officer to enter the house. As a matter of practice no difficulties have arisen up to date as to this power of entry, and it has not been found necessary to apply to a Magistrate for an order.

Assisted by the boys, the inspector examines as thoroughly and as quickly as he can all likely places where larvæ can be found. After a time, it need hardly be said, he knows where to look. Should it be necessary to go upstairs only the sub-inspector may do so. If accessible, the gutterings of the house are examined and cleaned out, meanwhile the oilman has set to work on the cess-pit into which he pours a little oil. Apart from the City, there is one man whose duty it is to inspect and report on the swampy places in the environs of the town, to superintend the clearing of the swamp, drains, etc., and there is a "special gang" of 18 men, who are permanently employed in carrying out minor sanitary works, such as filling up holes and so on.

At 11.45 a.m. and 3.45 p.m. the sub-inspectors return to the Health Office. Should larvæ have been found on any premises a sample of the water with the larvæ is collected in a test tube, labelled, and brought back to the Health Office. The breeding place is shown to the householder, who generally signs a book admitting that he has seen or been shown the "Wadudu." The sample at the Health Office is put into a special rack and the larvæ or pupæ batched out. This is simply for scientific purposes, but it may be of use in any subsequent legal proceedings, because the inspector can then go into court and swear that he found this particular specimen in the house or premises of the accused.

The names of those in whose houses larvæ have been found are entered in a card index. A "notice" to abate the nuisance is served on the offender that evening. Should larvæ be found again on that man's premises within a period of 20 days he is summoned to court, and, if convicted, is fined.

So far the highest fine inflicted has been Rs. 10. The prosecution is conducted by the police. It is only on rare occasions that any defence is offered. There is no necessity for the Health Officer to appear in court, and it is better for a multitude of reasons that he should take no part in the proceedings.

This anti-mosquito work has only been in operation since the beginning of March, and the results are, I think, satisfactory. It is difficult to say that one finds fewer mosquitoes in one's house, but it is evident that there must be fewer of these pests about from the number of breeding places which are discovered and treated before the larvæ have an opportunity of hatching out. Besides this weekly inspection business must have an educative value. A little while ago many fairly well educated Europeans did not know what mosquito larvæ looked like.

I venture to say that now there are very few, even among the Swahilis, who are not able to recognise what the Health Office Officials have come to look for in their houses.

To come down to figures the following table shows what has been done :—

TABLE 21.

Months.	Visits of Inspection.	Larvæ found.	Index per 100 houses.	Remarks.
March	2,604	135	5· 1	
April	3,600	140	3· 0	
May	4,665	143	3 08	
June...	3,594	34	0· 9	
July	4,546	39	0·85	
August	5,492	36	0·67	
September	6,162	127	2·06	Inspection extended to N'Gambo.
October	7,823	121	1·54	
November	7,415	113	1·52	
December	7,178	113	1·57	
Total	53,079	1,001	1·88	

That is to say, when the mosquito brigade first began its work, in every thousand houses which were visited larvæ were found breeding in 51, whilst 10 months later they could only be found in 15 or 16—practically a threefold reduction.

Finance.—I have been limited to the expenditure of £400 per annum on this mosquito work and the way I have divided this amount is as follows :—

4 Inspectors @ Rs.50 p.m.	Rs. 200
1 Sub-inspector for swamps @ Rs.20 p.m.	„ 20
15 Boys @ Rs.15 ea. a month	„ 225
Kerosine oil (16 tins)...	„ 38
Total Rupees	483

i.e., say £355 per annum.
Sundries 45 „ „
Total £400

5. BREEDING PLACES OF MOSQUITOES IN TOWN.

The following table is of interest as it indicates clearly where and in what sort of receptacle the various kinds of mosquitoes are to be found.

On examination of the table it is seen that *Stegomyia fasciata*, the mosquito with the striped legs, is found breeding practically in any water receptacle, but not in swamps, that the culex prefers drains and cess-pools, but can be found in most sorts of water receptacles, whilst anophelines generally keep to the swamps, and are only occasionally found in tanks, cisterns and water barrels.

TABLE 22.

SHOWING THE BREEDING PLACES OF THE VARIOUS KINDS OF MOSQUITOES.

Months.	Iron Drums and Cisterns.			Wooden Barrels.			Earthen Pots, Matungis, etc.			Cemented Tanks and Wells.			Drains, Cesspools, etc.			Empty tins and other vessels holding water.			Boats and Dhows.			Gutterings to houses.			Holes in trees, etc.			Swamps and other places.			TOTAL.			Rainfall in inches.
1913.	S	C	A	S	C	A	S	C	A	S	C	A	S	C	A	S	C	A	S	C	A	S	C	A	S	C	A	S	C	A	S	C	A	
January ...	4	3	0	10	5	0	4	2	0	0	2	1	0	5	0	5	2	0	4	1	0	0	0	0	2	1	0	0	0	8	29	21	9	0·39
February ...	3	0	1	8	7	0	5	0	0	5	1	0	0	9	0	0	0	0	2	0	0	1	0	0	2	0	0	0	0	2	26	17	3	1·37
March ...	35	13	0	28	21	0	11	3	0	2	4	0	2	7	0	5	3	0	0	0	0	6	2	0	2	1	0	0	2	7	91	56	7	9·99
April	15	23	0	18	22	1	12	17	0	5	4	2	0	4	0	3	6	0	3	2	0	10	4	0	0	8	0	0	0	32	66	90	35	17·59
May	45	2	0	33	2	1	27	2	1	11	0	6	2	6	0	6	2	0	1	0	0	8	2	0	3	2	0	0	1	27	136	19	35	11·18
June	8	0	0	12	1	1	6	0	0	5	0	4	0	3	0	1	0	0	9	2	0	2	0	0	0	0	0	0	1	5	43	7	10	0·07
July	10	0	0	10	2	0	5	0	0	7	1	1	0	9	0	1	1	0	4	0	0	0	0	0	0	0	0	0	1	6	37	14	7	0·31
August ...	7	0	0	8	2	0	7	0	0	7	2	1	1	11	0	2	0	0	2	0	0	1	0	0	0	0	0	0	0	4	35	15	5	0·88
September ...	43	0	0	24	4	0	24	2	0	12	6	0	1	8	0	3	0	0	5	0	0	3	0	0	0	0	0	0	0	12	115	22	12	2·58
October ...	49	2	0	14	3	0	10	2	0	16	9	0	0	3	0	5	0	0	7	1	0	5	1	0	2	5	0	0	1	10	108	27	10	4·22
November ...	39	0	0	11	4	0	19	1	0	14	2	0	0	5	0	11	0	0	6	0	0	7	3	0	1	3	0	0	2	12	108	20	12	3·20
December ...	33	5	0	18	2	0	18	0	0	6	2	0	2	7	0	2	0	0	15	2	0	4	0	0	2	1	0	0	0	7	100	19	7	1·31
Total ...	291	48	1	194	75	3	148	29	1	90	33	15	8	77	0	44	14	0	58	8	0	47	12	0	14	21	0	0	10	132	894	327	152	53·09

The identification of the above has been carried out under the supervision of Dr. Aders.

S—Stegomyia fasciata.
C—All Culicinæ (refer to Dr. Aders' list for species).
A—All Anophelinæ (ditto).

TABLE 23.

SHEWING THE NUMBER OF PREMISES, ETC., WHERE MOSQUITO LARVÆ WERE FOUND.

European quarters	74
Indian quarters	549
Arab quarters	85
Swahilis	60
Washihiri, Comoro, etc.	85
Stables and cowsheds	64
Mosques	46
Boats and dhows	66
Ruins, compounds, gardens, graveyards	72
Hotels, hospitals, and other places	120
Total	1,221

6.—LEPROSY.

In a correspondence addressed to the Executive on the Leprosy question in general, I have drawn attention to what appears to me to be an unsatisfactory position of affairs. I would therefore take this opportunity of recalling to you the leading points.

The total number of lepers in the two Islands, as far as can be ascertained at present, is, roughly, 450.

They are distributed as follows :—

Zanzibar—	
Walezo Leper Settlement (31st December, 1913)	95
Known to be at large in the Mwera District	17
,, ,, ,, Chwaka ,,	32
,, ,, ,, Mkokotoni ,,	13
Pemba—	
Nduni Leper Settlement	45
Pujini ,, ,,	78
Kengeja ,, ,,	48
Known to be at large in the Weti District	34
,, ,, ,, Chake ,,	71
,, ,, ,, M'Koani ,,	14
	447

Of this number only 268 are, it will be seen, under any sort of control. As to treatment, they get practically none at all, the settlements in all cases, even that of Walezo, being too far away for any of the Medical Staff to give that amount of assistance which the patients need and the medical man would like to render.

The money spent annually on feeding and maintaining the lepers in the various settlements comes to, roughly, Rs. 30,000* per annum, and it seems to me to be money spent without getting anything very much in the way of a return.

What was suggested in the correspondence referred to above amounted to this :—

(1) That there should be one central Leper Settlement, at a place to be decided on, in which all cases of leprosy should be segregated. I admit that the places I suggested were not agreed to, but that is a detail. Professor Simpson, I understand, advised that the acquisition of an island near M'Koani should be considered.

This island, in company with Professor Simpson, I visited in December.

There is no doubt it is the best place that has been suggested up to the present, and, as far as one could judge it would meet the case excellently.

---

* Includes the Poor House.

(2) That there should be a properly qualified European medical man with a suitable staff appointed to look after the patients. If the island near M'Koani were selected, the officer should reside at M'Koani and be in medical charge of that District in addition to his Leper duties.

(3) The question as to whether British East Africa should be asked to join in the scheme is not one for me to discuss here, but, as far as expense goes, it would probably be a saving to both Protectorates.

(4) I have also suggested in an earlier paragraph that a Lunatic Asylum should be under the same superintendence.

This scheme would of course depend on whether there was room or not. Personally, I think there would be, if Makongwe Island were decided upon. In the course of the next few months I hope to have the opportunity of visiting the famous Leper Colony on Robbin Island, whilst on my return from leave I should be glad if the Government would make it possible for me to visit the equally famous Hendela Settlement near Colombo, so that I could make myself thoroughly familiar with the details of organization, equipment and administration of these two model establishments. As regards the Leprosy question in general, the field in these Islands for research and experimental work in relation to endeavouring to find a cure or alleviate this disease is very large. It is almost a duty on the part of the Executive to make use of the opportunity from a broadly humane point of view, as well as from our own rather narrow one.

Experimental work on leprosy is going on in all quarters of the globe, in South Africa, in Manila, in India, and in the Pacific Islands. Zanzibar, with its exceptional opportunities, I am sorry to say, is lagging behind, and it is not right that this should be so.

To revert to the Walezo Leper Settlement.

TABLE 24.

Particulars.	Males.	Females.	Total.
The number of Lepers on 1st January, 1913, was	40	59	99
Number admitted during 1913	6	11	17
Number died during 1913	9	12	21
Total remaining 31st December, 1913	37	58	95

7. THE POOR HOUSE.

This institution may conveniently be considered here, as both it and the Leper Asylum are administered by the Roman Catholic Mission.

TABLE 25.

Particulars.	Males.	Females.	Total.
Number of patients in the Poor House on 1st January, 1913 ...	34	23	57
Number admitted during 1913	86	49	135
Number discharged	41	20	61
Number died	54	31	85
Number remaining under treatment	25	21	46

The very large number of deaths recorded (85) is due to the fact that the Poor House takes in cases which in many instances are in the last stages of disease. It is almost a home for the incurable and the dying. The clinical material is varied, and it is only a pity that greater use cannot be made of it.

The Fathers and the Sisters of the Roman Catholic Mission have continued in their unremitting attention to the sick.

It is with the greatest regret that I have to record the death of Sister Honorina, a lady who had devoted her life to looking after the sick and needy at Walezo.

8. PELLAGRA.

This is a condition which has latterly received much attention, not only on account of it having been established to be a disease more widely spread than was thought at first to be the case, but also on account of the existing mystery as to how it is transmitted.

It is a disease which is characterised by certain gastro-intestinal and cutaneous symptoms, and not infrequently ends in insanity. It has been established as existing chiefly in Southern Europe and Northern Africa. It is said to be spreading to such an extent in the United States as to have necessitated a special commission of investigation.

Recently Dr. Stannus, in an exhaustive enquiry,* has concluded that it exists in Nyasaland, and he further concludes, from information he has received, that it is also to be found in Zanzibar.

His later conclusion is arrived at after consideration of the clinical history and symptoms of cases and the *presence of Simuliidæ* in the Island.

In regard to this latter assumption, I am assured by Dr. Aders, that so far as his entomological research has gone, none of this family of diptera have ever been found here.

This is a matter of supreme importance, because the dominant theory at present, as to the vector of the disease, incriminates Simuliidæ and no other biting fly. If we have pellagra here and no Simuliidæ, then we are an exception in the world, and the Sambon theory as to Simuliidæ carrying the disease must be recast. Personally, I am not prepared to admit that pellagra exists in Zanzibar or Pemba.

---

* Note.—Trans. Soc. Trop. Med. & Hyg., November, 1913.

PART IV. (DIVISIONAL REPORTS.)

1. BACTERIOLOGICAL DIVISION.

Report by Dr. A. G. Carment, M.D., B.Sc. (Edin.)

The routine work of the department has been well up to the average and has fully occupied my time. The examination of rat slides for rat-plague has latterly been extended to spleen smears of all rats, dead or alive, brought to the office, and not only, as was formerly the practice, to those showing microscopic evidence of some abnormality.

A great deal of extra work has therefore been thrown upon the department and this, combined with my absence on duty in Pemba for three months, has precluded any original research work being undertaken.

The following table shows the special work carried out during the past 12 months :—

TABLE 26.

EXAMINATIONS IN THE LABORATORIES DURING 1913.

	Blood Films.	Sputa.	Nasal Scrapings.	Fæces.	Urines.	Smears.	Culture.	Preparation of Media.	Experimental Inoculations.	Chemical Preparation.	Analyses.	Veterinary.	Police.	Total.
January	15	11	6	22	8	8	3	2	—	1	3	1	1	81
February	20	2	2	41	4	7	3	4	4	4	9	3	—	103
March	11	12	—	20	8	7	2	—	1	2	1	3	—	67
April	12	6	6	27	7	12	4	3	—	14	3	8	1	103
May	25	4	1	15	14	7	3	1	—	2	4	12	—	88
June	12	10	3	24	12	2	—	—	—	—	1	—	2	66
July	2	17	5	31	8	5	—	—	—	—	5	5	2	80
August	2	9	1	20	6	1	—	—	—	—	4	4	—	47
September ...	4	14	3	15	7	2	—	4	—	—	3	4	3	59
October	18	3	—	67	8	8	—	6	—	5	11	3	—	129
November ...	45	5	1	61	14	14	5	5	1	3	7	7	—	168
December	8	17	—	27	8	6	9	3	5	—	12	1	1	97
Total	174	110	28	370	104	79	29	28	11	31	63	51	10	1,088

As to the results of specimens sent for a report :—

Of fæces examined,	anchylostoma were found in		59 per cent.
,, ,, ,,	rectal Bilharzia		2·4 ,,
,, ,, ,,	amœbiæ		1·3 ,,
,, blood films ,,	Malaria benign ...	11 per cent.	18·3 ,,
	Subtertian	4·5 ,,	
	Quartan ...	2·8 ,,	
,, ,, ,,	Filaria		1·7 ,,
,. Sputa ,,	Tubercle bacilli		21·8 ,,
,, Smears ,,	b. Lepræ		25·0 ,

In reviewing the work in the Bacteriological Laboratory, as shown in the day book, there are one or two points of more than ordinary importance.

The most interesting perhaps being that on two occasions the free swimming miracidia of urinary bilharziosis were found in urine to which no water had been added. I was present also one day when Dr. A. P. Watkins was examining a urinary deposit from another case, and live miracidia were also found.

We were particularly fortunate in getting material from a case of rectal bilharziosis occurring in a native private of the K.A.R.

His fæces were examined on various occasions and the typical lateral spined ova were found. He did not suffer from the bladder variety of the disease.

The fæces on two occasions were kept on purpose for two or three days as we were anxious to examine them thoroughly.

On both occasions the material became more or less liquified owing to putrefaction, but no water was added in making the microscopic preparation, but yet miracidia were found that had hatched out of the ova, each slide showing at least two or three such individuals. The large majority of ova showed no change.

From the findings in these two forms of bilharziosis, one is inclined to support the belief of Prof. Looss, that no intermediate host is required for the transmission of the disease, and in all probability the mode of entry into the human body is the same as in ankylostomiasis.

An interesting case occurred in the Government Hospital, from which blood films were taken.

The patient was a Singalese, who was stated to have had an attack of blackwater fever formerly. He was suffering from fever, temperature 102, when the films were taken : there was no evidence of blackwater fever. The films, which were stained with Leishman's stain, showed subtertian parasites, three-quarter formed ; besides these a large number of red cells showed what appeared to be an infection of Sporozoa-like bodies, average about 4 to a red cell in which malarial parasites were present. They were projecting from the surface of the red cells, very much like a fresh infection of ring forms, but they showed no other staining than what could represent chromatin, although there was a clear unstained part, which might have been a blood parasite.

This specimen was shown to Prof. W. J. R. Simpson, whose opinion was that it was of some interest. No blackwater fever supervened, and after the attack of malaria none of those bodies (?) were found.

The patient, it might be noted, since his attack of blackwater fever, had developed glycosuria. Had this anything to do with the non-appearance of blackwater fever on this occasion ?

While in Pemba I visited four leper settlements ; the lepers were in an advanced stage of the disease, almost without exception. Although their huts were not entered, yet I had their makeka (sleeping mats) brought out and carefully examined them for bugs, but on no occasion found any. However, another insect, which has not yet been identified, was invariably present in the interstices of the mats.

In one settlement I saw two boys, aged about 10 to 12, who showed marked leonine facial expression ; this must be an extremely rare condition at so early an age.

2. PORT MEDICAL SERVICE DIVISION.

The following table gives the figures of the shipping dealt with during the year.

TABLE 27.

PORT SANITARY SERVICE RETURNS FOR 1913.

Months.	Particulars of Steamers Arrivals.						Particulars of Dhow Arrivals.						Total No. of Passengers.	Remarks.
	No. of Steamer.	Nationality.		Pratique.		No. of Passengers.	No. of Dhows.	Nationality.		Pratique.		No. of Passengers.		
		British.	Foreign.	Full.	Restricted.			British.	Foreign.	Full.	Restricted.			
January ...	30	17	13	28	2	651	21	7	14	21	—	70	721	
February ...	23	14	9	23	—	558	61	14	47	61	—	421	979	
March ...	26	14	12	—	—	661	65	20	45	65	—	378	1,039	
April ...	26	16	10	—	—	869	2	2	—	2	—	7	876	
May	29	17	12	—	—	560	—	—	—	—	—	—	560	
June	28	17	11	—	—	617	—	—	—	—	—	—	617	
July	35	21	14	—	—	532	—	—	—	—	—	—	532	
August ...	29	17	12	—	—	413	—	—	—	—	—	—	413	
September ...	31	19	12	—	—	546	—	—	—	—	—	—	546	
October ...	29	16	13	—	—	753	—	—	—	—	—	—	753	
November ...	27	13	14	—	—	628	1	1	—	—	1	—	628	
December ...	34	18	16	—	—	267	18	12	6	9	9	64	331	
Total ...	347	199	148	51	2	7,055	168	56	112	158	10	940	7,995	

3. TOWN SANITATION DIVISION.

(a) Disinfection.

Number of premises disinfected	275
,, ,, dhows ,, ...	40
,, ,, drains ,, ...	519

103 premises were disinfected as the result of notification of tuberculosis.

(b) Dairies and Stables.

Visits of inspection	774
Ordered to be cleaned out	213

(c) Inspection of Shops and Food-stuffs.

Grocery shops	159
Fruit ,, ...	62
Godowns	32
Bake houses	28
Aerated water factories	84
Markets	118

Food-stuff Condemned—

Potatoes, bags	108
,, cart loads	7
Dried fish, bags	51
Onions, bags	51
,, cart loads	117
Thabi, bags	1
Oranges, cart loads	3
Beans, bags	4

(*d*) Wells.

5 wells permanently closed.

(*e*) Housing.

Lodging houses inspected	2,321
Indian hotels	43
"Coffee" shops	79

301 of these were ordered to be cleaned out and whitewashed.

(*f*) Conservancy.

House closets cleaned out	864
Cess-pits filled in	7

(*g*) Ruins, Compounds, etc.

Ruins cleaned out	69
Compounds cleaned out	108
Grave yards cleaned out	200
Grave yards walled in	7

(*h*) Removal of Refuse.

Carts loads removed	52,225
Monthly average	4352·2

The work of filling up and reclaiming the creek near the destructor is getting along very quickly, and I can only hope that in the near future a wide road on the east side of the creek will face that one already made on the west.

(*i*) Routine Anti-Mosquito Work.

Swamps were kerosined on	106	occasions.
Cess-pits and cess-pools were kerosined on	7,990	,,
Gutterings were cleaned out on	1,996	,,
Drains were kerosined on	1,407	,,
Boats and dhows were inspected on	768	,,

(*j*) Nuisances.

Notices served for repairs to drains, etc.	464
,, ,, abatement for mosquito nuisance	649
,, ,, for filling in wells	2
,, ,, ,, walling in grave-yards	1
,, ,, ,, cleaning out latrines	5
,, ,, ,, ,, ,, compounds	3
,, ,, ,, smoke abatement	2
,, ,, ,, repairs to cowsheds	8
,, ,, ,, nuisance due to noxious trades	1
Total	1,135

4. THE VETERINARY DIVISION.

Report by Mr. J. A. N. da Cunha, Veterinary Officer.

With the exception of East Coast Fever, which is enzootic, the Island has remained free from epizootic disease during the past year.

Slaughter House.—The sale of meat is under strict supervision, and all stock is examined at the Government abattoir before slaughter, and the carcases after.

Private abattoirs belonging to the various Jamats have also been subjected to periodical inspection.

The following table shows the number of stock examined.

TABLE 28.

Stock.	Killed.	Rejected.	Total Condemned.	Partially Condemned.
Oxen	1,985	14	9	194
Goats	12,862	—	8	241
Camels	20	—	—	5
Sheep	1,124	19	15	531
Buffaloes	—	—	—	—

Import and Export of Stock.—The following table gives the figures.

TABLE 29.

ANIMALS EXPORTED DURING 1913.

	Bullocks.	Cows.	Calves.	Sheep.	Goats.	Kids.	Camels.	Horses.	Mares.	Mules.	Donkeys.	Buffaloes.	Totals.
January	14	1	—	10	102	—	—	—	—	—	2	—	129
February	6	1	—	—	16	—	2	—	—	10	1	—	36
March	11	5	—	18	6	—	—	—	—	—	1	—	41
April	—	—	—	2	15	—	—	—	—	—	2	—	19
May	7	—	—	6	—	—	—	1	—	1	1	—	16
June	—	1	—	4	20	—	—	—	—	—	1	—	26
July	6	6	—	2	19	—	—	—	—	—	—	—	33
August...	30	14	—	13	105	—	—	2	—	1	8	—	173
September	65	29	2	12	9	—	—	—	—	2	21	—	140
October	104	93	5	—	209	—	—	2	—	—	14	—	432
November	77	76	6	10	88	—	—	1	—	—	9	—	267
December	75	66	1	3	173	—	—	1	—	—	12	—	331
Totals	395	297	14	80	762	—	2	7	—	14	72	—	1,643

TABLE 30.

ANIMALS IMPORTED DURING 1913.

	Bullocks.	Cows.	Calves.	Sheep.	Goats.	Kids.	Camels.	Horses.	Mares.	Mules.	Donkeys.	Buffaloes.	Total.
January	244	37	—	255	686	—	11	—	—	—	—	—	1,203
February	127	56	—	261	748	—	3	2	—	—	4	2	1,203
March...	241	35	—	359	841	—	—	—	—	—	5	—	1,481
April	134	—	—	508	564	—	—	1	—	1	4	—	1,212
May	132	15	—	320	265	—	—	1	—	—	—	—	733
June	212	11	2	275	369	—	—	—	—	—	—	—	869
July	163	—	—	311	506	—	—	—	—	—	—	—	980
August	133	11	—	563	373	—	1	—	—	—	—	—	1,081
September	243	3	—	338	221	—	—	—	—	—	—	—	805
October	265	—	—	389	751	—	—	—	—	—	1	—	1,406
November	289	8	—	1,023	806	—	—	—	—	—	6	—	2,132
December	147	2	—	215	207	—	—	—	—	—	—	—	572
Totals	2,300	178	2	4,817	6,337	—	15	4	—	1	20	2	13,677

Dairies and Cowsheds.—Periodical inspections were made. The general insanitary conditions show but little signs of any improvement. On the whole the health of the cows appears to be good.

Nine milch cows were suspected of tuberculosis and consequently were subjected to the tuberculin test, none however reacted. Three samples of milk drawn from udders suspected of specific ulceration were forwarded to the Bacteriologist, but tubercle bacilli were not found.

Stock Inspection.—The New Cattle Quarantine Station on the Pigaduri Peninsula was opened in the past year. Difficulties were raised by importers of stock in regard to landing cattle, but when the matter came to the test, it was seen that there existed no reasonable ground for complaint. No doubt, if Zanzibar were a port into which a large number of valuable animals were imported a jetty would be convenient, but as things are, the present condition meets the case.

All Indian cattle are subjected to a period of quarantine against Surra.

Whilst undergoing this a systematic examination is made for the causal organism, the trypansoma evansi, both by the direct method of examining the wet blood film and by injecting into dogs a certain quantity of the blood of the animal. If the dog after the fourteenth day shows no evidence of a trypanosome infection, the cattle are allowed to pass through.

The thanks of the department are due to Dr. Aders for his help in the work. I may add that he has not only given me the benefit of his advice, but has assisted me in every way in carrying out the work.

Incidentally it may be mentioned here that all milch cows whilst on probation at Pigaduri undergo the tuberculin test.

Any animal reacting is refused, whilst doubtful cases are kept another month and again tested.

A necessity at Pigaduri is a dipping tank and a fly-proof stable.

The former is necessary to safeguard the Government against any possible action for damages on account of any imported, non-immune cattle acquiring East Coast Fever during their enforced stay at the station. At the present moment, so far as we know, Pigaduri is clear from East Coast Fever, but it is impossible to say how long this state of affairs will last, and if a valuable Indian milch herd contracted East Coast Fever the imputation would be that the disease was acquired at Pigaduri through negligence of the Government in not taking such precautions as are now commonly employed in nearly all East Coast Fever areas in Africa.

The fly-proof stable is necessary for our own protection.

Supposing a case of Surra was by any misfortune imported: it takes 14 days before the diagnosis is confirmed by subinoculation into dogs. Meantime, with blood sucking diptera in any quantity at the Station, our quarantine restrictions, instead of protecting the Islands, have simply favoured the creation of a reservoir.

I urge on the Government the desirability of considering very seriously this question. They have only to refer to the losses which occurred in Mauritius owing to the importation of stock infected with Surra from India.

With respect to the importation of cattle from the German and Benadir Coast, the figures of which are quoted in another paragraph, the latitude allowed to importers is not altogether beyond criticism. The animals are landed at the quarantine station and examined by me as thoroughly as possible; unless they are suffering from obvious disease they are passed and allowed to proceed to the various dairies in the town.

Of, say, a batch of 150 or 160, only five or six are slaughtered day by day, the survivors being taken daily to the various pasturages, where a proportion become infected with East Coast Fever. The infection is thus kept up in ticks, and therefore these fresh animals form a reservoir for the disease.

The ideal method of dealing with this class of animals is to insist that an animal shall be landed at Pigaduri and shall leave it only as meat.

To carry this out means the provision of a slaughter-house at Pigaduri and an arrangement by which the carcases can be transported to the meat markets by means of an aerial tramway.

The problem has been considered by the Public Works Department, and the opinion given was that there were no grounds for objection, either on account of engineering difficulties or great expense.

In other words, everything to do with cattle should be carried out under one roof so to speak, and that roof should be at the Pigaduri Cattle Quarantine Station.

Veterinary Hospital.—The total number of cruelty cases treated was 54, of these 41 were equines and 13 bovines.

The number of prosecutions for cruelty instituted during the year was 23, out of which 19 resulted in convictions.

As regards the Stable and Transport Department, professional assistance was only rendered when demanded by the Superintendent.

5. PREVENTION OF INFECTIOUS DISEASES DIVISION.

(*a*) Infectious Diseases Hospital at Gulioni.

The following table shows the admission to the Hospital during the past year :—

TABLE 31.

Diseases.	Remained from 1912.	Admitted.	Total.	Died.	Discharged.	Escaped.	Remaining for 1914.	
Plague	—	1	1	—	—	—	1	Ex S.S. "Praesident."
Small-pox	—	17	17	2	15	—	—	
Chicken-pox	—	4	4	—	4	—	—	
Measles	—	5	5	—	5	—	—	
Mumps	—	38	38	—	37	1	—	Prison.
Tetanus	—	1	1	—	—	—	1	
Under Observation.								
Final Diagnosis.								
Pneumonia	—	1	1	—	—	—	1	
Leprosy	—	5	5	—	4	1	—	Discharged to Walezo.
Malaria	1	—	1	—	1	—	—	
Insanity	—	1	1	—	1	—	—	Discharged to Poor House.
Heart Disease	—	1	1	—	1	—	—	
Anæmia	—	2	2	—	2	—	—	Discharged to Poor House.
Prolapse of Rectum ...	1	—	1	—	1	—	—	
Total	2	76	78	2	71	2	3	
Contacts	—	36	36	—	35	—	1	[House.
Paupers	—	24	24	—	24	—	—	Pending removal to Poor
Total	2	136	138	2	130	2	4	

The above table shows the somewhat varied use to which the Infectious Diseases Hospital is put to at times.

For instance, paupers are sent down from Pemba for transfer to the Walezo Poor House, and often, owing to the lateness of the hour at which they arrive, it is necessary to find accommodation for them for the night. They are, therefore, unless there are cogent reasons to the contrary, sent to Gulioni until the next morning. This practice may not, it is true, be ideal, but situated as we are, it is as well at times not to be too meticulous, and one is often obliged to do the best one can. These transit cases are well isolated from the sick, and in actual practice there is but small danger of them carrying away infection.

The contact cases were brought in on account of small-pox. None of them developed the disease.

The case of Tetanus was admitted early in the course of the disease. He was given tetanus antitoxin, of which a new supply arrives every month, and, I am bound to say, to my astonishment, he recovered.

In general, the provision of a permanent Infectious Diseases Hospital puts Zanzibar in a very strong position in combating infectious disease, and I feel confident you will agree that the money spent on its staff and maintenance is well spent. The provision of some better means than at present exist for disinfecting infected clothing is badly needed, but I am in hopes I shall have got a Thresh's Disinfector by the end of this year.

(*b*) The Quarantine Station at Prison Island.

The existence of plague at Mombasa has compelled the quarantining on the island of native Indian and African passengers from that port.

Altogether during the past year 944 passengers have been quarantined for the prescribed period.

None of these developed plague or any other sickness.

In the months of January and February a certain number of passengers for the German Coast Ports were obliged to undergo a period of quarantine on account of the German Authorities declining to consider Zanzibar as clear of Cholera. The same applied to Pemba passengers in January, 1913.

The following table shows the details as to the number of passengers, their origin or their destination.

TABLE 32.

PASSENGERS LANDED AT THE QUARANTINE STATION, 1913.

Month.	No. of Passengers.	By Dhow or Steamer.	Month.	No. of Passengers.	By Dhow or Steamer.	Month.	No. of Passengers.	By Dhow or Steamer.	Month.	No. of Passengers.	By Dhow or Steamer.	Month.	No. of Passengers.	By Steamer.	Month.	No. of Passengers.	By Steamer.
Jan.	230	31 Dhows for Pemba.	Feb.	3	From Daressalam.	March	10	S.S. Tuna.	April.	7	S.S. Wisman.	May.	1	S.S. Praesident.	June.	13	S.S. Kilwa.
	6	Daressalam.		10	Tanga.		11	,, Kilwa.		5	,, Purnia.		4	,, Wisman.		23	,, Purnia.
	1	Tanga.		4	Dhow for Mombasa.					2	,, Kilwa.		7	,, Kilwa.		7	,, Tuna.
	1	From Mombasa.								1	,, Pentakota.		12	,, Tuna.			
													11	,, Pundua.			
													3	,, Mark Graf.			
													2	,, Purnia.			
													4	,, Palamkota.			
													2	,, Traveller.			
	238			17			21			15			46			43	

Month.	No. of Passengers.	By Steamer.	Month.	No. of Passengers.	By Steamer.	Month.	No. of Passengers.	By Steamer.	Month.	No. of Passengers.	By Steamer.	Month.	No. of Passengers.	By Steamer.	Month.	No. of Passengers.	By Steamer.
July.	13	S.S. Kilwa.	Aug.	25	S.S. Kilwa.	Sept.	21	S.S. Pundua.	October	11	S.S. Wisman.	Nov.	1	S.S. Feld Marschall	Dec.	1	S.S. Matiana.
	24	,, Pundua.		5	,, Tuna.		3	,, Gaika.		2	,, Gason.		3	,, Praesident.		9	,, Duplex.
	7	,, Kilwa.		5	,, Lindula.		10	,, Tuna.		11	,, Kilwa.		9	,, Caresbrook.		5	,, Mark Graf.
	3	,, Tuna.		9	,, Goorkha.		7	,, Praesident.		18	,, Palamkota.		7	,, Kilwa.		7	,, Kilwa.
	10	,, Pentakota.		2	,, Prinzregent.		1	,, Prinzessin.		1	,, Admiral.		3	,, Khalifa.		4	,, Pentakota.
	3	,, Tabora.		8	,, Mark Graf.		23	,, Palamkota.		3	,, Mark Graf.		15	,, Palamkota.		5	,, Wisman.
	4	,, Admiral.		11	,, Tuna.		21	,, Tuna.		20	,, Wisman.		5	,, Kilwa.		8	,, Praesident.
	29	,, Palamkota.		10	,, Pentakota.		1	,, Kronprinz.		1	,, Kilwa.		18	,, Tuna.		3	,, Berbera.
	20	,, Kilwa.		5	,, Kilwa.		6	,, Kilwa.		7	,, Pundua.		11	,, Konig.		4	,, Kilwa.
	5	,, Tuna.		1	,, Tuna.		10	,, Purnia.		5	,, Burgermeister.		8	,, Kilwa.		7	,, Lindula.
				2	,, Prinzessin.		11	,, Kilwa.					26	,, Purnia.		2	,, Prinzessin.
													5	,, Wisman.		4	,, Wisman.
	118			83			114			79			111			59	

6. PEMBA DIVISION.

Report by A. P. Watkins, M.A., M.R.C.S., L.R.C.P.

The purpose of an Annual Report must be primarily, to find in the monthly tabulated results some justification for the existence of the officials, from highest to lowest, and in a secondary sense—and to my mind of vastly greater importance—to point out the failures in the efforts made to improve the conditions and their reasons.

While this may appear as a reflection on my predecessors' management of the matters with which the Department has been concerned, I wish, at once to assert, that I have no such *arrièrè pensée*, but should myself have been able to do no more than they did.

The Island has been fortunately free from any serious outbreak of disease, only two cases of small-pox and a few cases of measles being notified during the year.

I.—Mosquito Inspection.

TABLE 33.

Houses Visited.	Chake Chake.	Weti.	M'Koani.	Jambangome.
January	296	120	—	—
February	328	225	—	—
March	508	313	41	53
April	456	403	43	32
May	509	410	41	29
June	438	500	44	—
July	646	514	—	—
August...	514	547	32	29
September	303	449	—	—
October	93	232	100	60
November	239	284	85	50
December	527	281	102	50
Total	4,857	4,178	488	303

(*b*) Larvæ found, notices sent and if not abated, prosecutions issued.

TABLE 34.

During	Chake Chake		Weti		M'Koani		Jambangome	
	Found	Notices.	Found	Notices.	Found	Notices.	Found	Notices.
January	11	11	—	—	—	—	—	—
February	14	13	3	3	—	—	—	—
March	52	47	4	2	6	6	3	3
April	11	11	22	22	—	—	—	—
May	4	4	11	11	—	—	—	—
June	13	13	8	7	—	—	—	—
July	14	13	13	13	—	—	—	—
August	15	15	4	4	—	—	—	—
September	6	6	7	7	—	—	—	—
October	3	3	2	2	—	—	—	—
November	6	6	2	2	—	—	—	—
December	6	6	1	1	—	—	—	—
Total... ...	155	155	77	77	6	6	3	3
Average % ...	3·1		1·8		1·2		·9	

In spite of the fact that at Chake Chake in only 3·11 per cent. of visits were larvæ present, and at Weti in 1·8 per cent., yet complaints have been numerous as to the prevalence of the pests all through the year.

TABLE 35.

II.—NOTICES SERVED FOR OTHER NUISANCES WITH CONVICTIONS OBTAINED.

During	Chake Chake.		Weti.		M'Koani.		Jambangome.	
	Notices.	Conv'tions.	Notices.	Conv'tions.	Notices.	Conv'tions.	Notices.	Conv'tions.
January	7	—	1	—	—	—	—	—
February	8	1	—	—	—	—	—	—
March	5	5	2	2	—	—	3	—
April	3	2	8	6	—	—	1	—
May	—	—	—	—	3	—	—	2
June	2	—	—	—	—	—	—	—
July	4	—	—	—	—	—	—	—
August	—	3	4	—	—	—	—	—
September ...	1	—	8	—	—	—	—	—
October	10	2	1	—	—	—	—	—
November	7	—	1	—	2	—	—	—
December	22	—	2	—	—	—	—	—
TOTAL	69	13	27	8	5	—	4	2

Under this section are included all convictions for breeding mosquito larvæ, for having faulty drains, cess-pits, down-spouts, etc.

It is a pleasing fact, that out of 105 notices served only 23 required prosecuting, all of which resulted in convictions.

III.—VACCINATION.

TABLE 36.

During	Chake Chake.	Weti.	M'Koani.	Jambangome.
January	230	224	69	—
February...	196	85	81	—
March	251	139	58	24
April	81	184	71	39
May	271	172	47	—
June	62	85	81	—
July	103	61	37	—
August	34	53	35	—
September	29	69	281	—
October	634	437	2,773	—
November	108	325	609	—
December	2	196	502	—
TOTAL	2,001	2,030	4,644	63

Vaccination must be much more vigorously pressed than it has been. In evidence of this necessity, the number vaccinated at M'Koani (2,773 for October, although it was a precautionary measure, a case of small-pox having occurred at Fufuni) among all the neighbouring shambas and not among the clove pickers who had been imported from Zanzibar, shows there is a great number of people who require this means of acquiring immunity. To do this properly an itinerant ex-vaccinator should be employed with an assistant to go all over the Island.

The sanitary and sub-inspectors have too much to do to undertake this work in addition to their present duties.

TABLE 37.

IV.—CESS-PIT AND SWAMPS KEROSINED.

During.	Chake Chake.		Weti.		M'Koani.	
	Cess-Pits.	Swamps.	Cess-Pits.	Swamps.	Cess-Pits.	Swamps.
January	—	1	—	1	—	1
February...	89	1	—	—	—	—
March	152	1	—	—	—	—
April	91	—	—	—	—	1
May	104	—	—	4	5	1
June	88	1	—	—	20	—
July	81	1	—	—	20	—
August	103	—	—	1	25	—
September	63	1	—	—	20	—
October	43	—	—	—	—	—
November	63	6	20	5	20	1
December	90	6	20	2	20	1
TOTAL	967	18	40	13	130	5

Kerosining swamps is really a useless expenditure. This may seem an absurd statement, but if the facts be borne in mind, that in no case is a single swamp properly channelled or graded, its truth is obvious; for every shower washes out the contents of the puddles and make them ready for the next brood of mosquitoes. Until some systematic attention is given, it is useless, unless the general health of the community can be really benefited, and the money spent at present is a sheer waste.

TABLE 38.

V.—CATTLE EXAMINED.

During	Chake Chake.	Weti.	M'Koani.
January	—	—	29
February	37	—	38
March	11	—	17
April	14	—	—
May	15	—	3
June	3	—	11
July	9	—	9
August	71	77	12
September	81	136	219
October	202	245	173
November	81	239	189
December	76	22	68
TOTAL	690	719	768

The examination of cattle has been carried out as efficaciously as possible. The signs of the more common diseases have been communicated to those responsible for this work.

But it would be a much better plan if all cattle for the Island had to undergo this examination at Zanzibar by a qualified veterinary surgeon before being allowed to come here.

This also would save Rs. 480 per annum and would not add very considerably to the work of the Department in Zanzibar.

TABLE 39.

VI.—Lepers in the Three Settlements.

During	Nduni.	Pugini.	Kengeja.	Total.
January	—	—	—	144
February March } No record of numbers given	in Report.			
April	48	70	48	166
May	45	73	48	166
June	46	73	48	167
July	46	74	48	168
August	45	74	48	167
September	45	70	48	163
October	45	70	48	163
November	45	72	48	166
December	45	78	48	171

The problem of the Leper Settlements being *sub judice*, it may be superfluous to make any remark, but as nothing will probably be done in the immediate future, it may be as well to point out, at the present moment, the following requirements must be met—(1) more huts, especially at Pugini; (2) repairs to old ones at each station; (3) wells, or some proper provision for water made; (4) New Makutis at all settlements; (5) new tools.

As I pointed out in the December Report, if the leper vote is Rs. 30,000 a fairer division of the money ought to be made.

Walezo, with less than 100 taking over a third more of the vote than is granted these poor sufferers here, nearly double the number.

TABLE 40.

VII.—Births and Deaths.

During.	Cheke.		Weti.		M'Koani.	
	Births.	Deaths.	Births.	Deaths.	Births.	Deaths.
January	26	57	16	26	4	12
February...	18	34	41	27	11	8
March	27	42	13	33	17	15
April	65	44	31	38	4	10
May	90	83	22	41	18	20
June	50	46	27	42	26	25
July	54	41	9	16	80	30
August	48	40	41	45	35	22
September	50	49	31	39	35	12
October	44	45	70	45	22	20
November	35	36	44	34	15	23
December	37	50	28	49	24	22
Total	544	567	373	435	291	219

TABLE 41.

TOTAL BIRTHS AND DEATHS.

	1913.	1912.	1911.	1910.
Births	1,208	1,392	532	602
Deaths	1,221	1,013	1,055	1,077

The Birth and Death Rates at Chake Chake and Weti are very disturbing. Probably it would be so also at M'Koani, had it not been for the enormous influx of clove pickers. There is an almost total lack of children among the Swahilis. The Arabs are more prolific and the Indians most of all. Among the natives, in my opinion, the promiscuous life lived, the early incidence of puberty and, one might almost state, the invariably acquired Gonorrhœa preclude proper maturity ever being reached and so probably account largely for the deaths of children.

I believe some system of registration must be adopted, which will be adequate, but it will not make up for the excess of deaths over births.

VIII.—Food Stuff.

Chake Chake.—19 bags of rice were condemned as unfit for human food.

M'Koani.—In October and November Bread and Dates have been condemned for same reason.

IX.—Zymotic Diseases.

In September one case diagnosed as Chicken-Pox proved to be Small-Pox and one case resulted from the contact. Both were isolated at M'Koani.

In November two cases of measles occurred.

X.—Quarantine.

In January 3 Dhows were quarantined at Chake Chake, and at Weti 19 in January, 2 in February, 2 in March, 6 in August, 9 in October and 5 in November.

PART V. (SPECIAL REPORTS).

1. MEDICAL INSPECTION OF SCHOOL CHILDREN.

By The Medical Officer of Health.

In a recent issue of the *Lancet** attention was called to the lack of information as to the extent to which school medical inspection was practised in India, and the implication was made that the time had come, when this side of social hygiene should be placed on a more modern and scientific basis. This annotation elicited a reply from Col. W. G. King, I.M.S., who stated that school medical inspection had been in force in the Madras Presidency since 1886; so I am afraid that in these circumstances Zanzibar cannot congratulate itself on being actually the first Eastern State in this field.

Previous to 1913, the children in the Government School had been examined by the Medical Department, but attention had largely been devoted to what I may call the clinical aspect. When, therefore, I suggested to the Director of Education that it would be advisable to have a yearly physical examination made of each child, he readily seconded the proposal. The Principal Medical Officer pointed out, however, that his time, and that of his staff, was already fully occupied, and that according to the more modern views school inspection was work which more properly came under the ægis of the Public Health Department.

An arrangement was therefore come to by which the Public Health Department should detail a sub-assistant surgeon to attend a dispensary, which was instituted in the school building, and see and attend to such cases of trivial ailments as he was able, and that more severe cases should be sent on to the Government Hospital for further treatment and advice.

The Medical Officer of Health arranged that he should examine physically every child attending the school, not only in town but in the districts, and that each child should have a medical history sheet on which should be recorded such details as his weight, height, chest measurements, eye-sight, hearing and so on, so arranged that year by year the physical development of the child could be followed.

This procedure came into being in March, 1913, and I venture to suggest to you, that not only is the Zanzibar Education Department one of the first in Africa to adopt this scheme, but possibly also one of the first in our Colonies or Protectorates.

The practice as applied to Swahili, Arab and Indian children presents many advantages.

In the first place, it familiarises the rising generation of a population with European medicine and its ways; secondly, a certain amount of information is collected, which has an anthropometric importance; and, thirdly, it will act, I hope, in the end, as an aid to that hygienic instruction and discipline to which I have referred in the covering memorandum to this Report. But apart altogether from these, perhaps indefinite, advantages, the establishment of a dispensary at the school has, I think it will be agreed, been a saving in the working time both of the school and of the Government Hospital.

Previous to March the practice was for a sick child to get a "chit" from the Head-Master and then go up to the Hospital for treatment. If the child was suffering from a minor ailment he would be away at least an hour, as it can readily be understood, that there would be no hurry on his part to get back to school. No doubt, also, there was a certain amount of malingering, solely with a view to a little outing in the middle of the morning. A cloud of children with all manner of small ailments arriving at the hospital must also have clogged the out-patient department a great deal.

---

* Note, p. 508, *Lancet*, August 16th, 1913.

All this is now done away with ; the child is seen and if necessary is given medicine or dressings at the school, and if able to return to his class room is sent back at once.

Medical Treatment.—As to the amount of trivial ailments dealt with at the dispensary, out of 3,563 cases attended to, it was only found necessary to send 19 of them to the Government Hospital for further treatment, and of these, a certain proportion went to see Dr. Curwen, who very kindly consented to deal with the eye cases, in which subject he has specialised.

Between the 11th March and 31st December, I consider, allowing each child one hour's absence under the former condition, and at the most half-an-hour including that time spent in waiting for his turn, under the new, that a matter of 2 months, 2 weeks, 3 days, 19 hours and 13 minutes have been added to the school working time. That in itself is something done.

The following table shows the weekly attendance of sick at the school dispensary :—

TABLE 42.

SHOWING WEEKLY ATTENDANCE.

Week ending on	Reported sick.	Sent to Government Hospital.
11th March	182	2
18th ,,	186	3
25th ,,	119	3
1st April	103	5
8th ,,	168	—
15th ,,	104	—
22nd ,,	57	—
29th ,,	15	—
6th May	30	—
13th ,,	101	—
20th ,,	86	—
27th ,,	93	—
3rd June	87	—
10th ,,	90	—
17th ,,	101	2
24th ,,	92	—
1st July	86	—
8th ,,	74	—
15th ,,	82	—
22nd ,,	77	—
29th ,,	71	—
5th August	57	—
7th October	24	—
14th ,,	112	2
21st ,,	118	—
28th ,,	128	—
4th November	118	—
11th ,,	86	—
18th ,,	132	—
25th ,,	156	—
2nd December	162	—
9th ,,	104	—
16th ,,	137	—
23rd ,,	129	—
31st ,,	96	2
	3,563	19

As the school was only open for 193 working days the average daily attendance works out at 18·46.

The following table shows the diseases.

TABLE 43.

YEARLY RETURN OF SCHOOL DISPENSARY FROM 4th MARCH TO 31st DECEMBER, 1913.

Disease.	No.
Abscess	25
Anæmia	7
Bronchitis	351
Conjunctivitis	22
Dyspepsia	47
Diarrhœa	26
Elephantiasis	5
Eczema	2
Gonorrhœa	12
Itch	165
Malaria	554
Minor diseases	1,406
Otitis	26
Orchitis	7
Rheumatism	28
Soft Chancre	1
Syphilis	1
Tonsillitis	7
Ulcer	867
Ringworm	4
TOTAL	3,563

In regard to the above table it is seen that no fewer than 14 children were suffering from venereal disease.

These cases are at once reported through the Head Master to the Director and are not allowed to attend school until they have completely recovered.

Physical Examination.—207 of the Zanzibar children have been thoroughly examined, 25 at Bumbwini and all the children attending the Government Schools in Pemba.

I do not propose publishing any results or tables this year, because, by next year, when four or five hundred children have been seen, some sort of standard will have been established and deviations from the normal will be more apparent.

It may be said, though, without prejudicing further remarks, that the physical condition of those children already examined is in general good, defective eyesight, congenital disease, poor hearing and so on being fairly rarely met with.

2. BERI-BERI IN ZANZIBAR.

By the Medical Officer of Health.

Dr. MacDonald, P.M.O., has very kindly furnished me with the following tables, which indicate very clearly the relative annual incidence of the disease among the prisoners and troops stationed in the Island.

TABLE 44.

PRISONERS SUFFERING FROM BERI-BERI ADMITTED INTO HOSPITAL (RE-ADMISSIONS INCLUDED).

	1907.		1908.		1909.		1910.		1911.		1912.		1913.	
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
January ...	Nil	Nil	1	—	3	—	6	—	2	—	2	—	1	—
February ...	Nil	Nil	—	—	—	—	1	—	—	—	1	—	—	—
March ...	Nil	Nil	—	—	2	—	—	—	—	—	1	—	1	—
April ...	Nil	Nil	—	—	1	—	1	—	2	—	1	—	—	—
May ...	Nil	Nil	1	—	1	—	1	—	2	—	—	—	1	—
June ...	Nil	Nil	—	—	3	—	1	—	2	—	—	—	—	—
July ...	Nil	Nil	2	—	—	—	2	—	1	1	—	—	—	—
August ...	Nil	Nil	—	—	6	2	—	—	1	—	—	—	3	—
September	Nil	Nil	4	1	4	—	2	—	—	—	—	—	—	—
October ...	Nil	Nil	4	1	2	—	3	1	—	—	—	—	—	—
November	Nil	Nil	—	—	—	—	—	—	1	—	1	1	—	—
December	Nil	Nil	2	—	—	—	—	—	2	—	—	—	—	—
Total ...	Nil	Nil	14	2	22	2	17	1	13	1	6	1	6	—

Admissions 78. Deaths 7.

N.B.—Boiling of sleeping mats began on 27th November, 1910.

TABLE 45.

PRISONERS SUFFERING FROM BERI-BERI ADMITTED INTO HOSPITAL (RE-ADMISSIONS *NOT* INCLUDED).

	1907.		1908.		1909.		1910.		1911.		1912.		1913.	
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
January ...	Nil.	Nil.	1	—	3	—	5	—	1	—	1	—	—	—
February ...	Nil.	Nil.	—	—	—	—	1	—	—	—	—	—	—	—
March ...	Nil.	Nil.	—	—	2	—	—	—	—	—	—	—	1	—
April ...	Nil.	Nil.	—	—	1	—	1	—	2	—	1	—	—	—
May ...	Nil.	Nil.	1	—	1	—	1	—	1	—	—	—	1	—
June ...	Nil	Nil.	—	—	3	—	—	—	1	—	—	—	—	—
July ...	Nil.	Nil.	2	—	—	—	2	—	1	1	—	—	—	—
August ...	Nil.	Nil.	—	—	4	1	—	—	1	—	—	—	2	—
September	Nil.	Nil.	4	1	4	—	1	—	—	—	—	—	—	—
October ...	Nil.	Nil.	4	1	1	—	2	—	—	—	—	—	—	—
November	Nil.	Nil.	—	—	—	—	—	—	—	—	—	—	—	—
December ...	Nil.	Nil.	2	—	—	—	—	—	1	—	—	—	—	—
Total ...	Nil.	Nil.	14	2	19	1	13	—	8	1	2	—	4	—

New Admissions, 60. Deaths, 4.

N.B.—Boiling of sleeping mats began on 27th of November, 1910.

TABLE 46.

KING'S AFRICAN RIFLES SUFFERING FROM BERI-BERI ADMITTED INTO HOSPITAL.

	1907.		1908.		1909.		1910.		1911.		1912.		1913.	
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
January ...	—	—	—	—	3	—	1	—	—	—	Nil.	Nil.	Nil.	Nil.
February...	—	—	—	—	—	—	—	—	—	—	Nil.	Nil.	Nil.	Nil.
March ...	—	—	—	—	—	—	—	—	—	—	Nil.	Nil.	Nil.	Nil.
April ...	—	—	—	—	—	—	—	—	—	—	Nil.	Nil.	Nil.	Nil.
May ...	—	—	1	—	—	—	—	—	—	—	Nil.	Nil.	Nil.	Nil.
June ...	—	—	—	—	—	—	2	—	—	—	Nil.	Nil.	Nil.	Nil.
July ...	1	1	—	—	—	—	—	—	5	—	Nil.	Nil.	Nil.	Nil.
August ...	—	—	—	—	—	—	—	—	2	—	Nil.	Nil.	Nil.	Nil.
September	2	—	—	—	—	—	—	—	—	—	Nil.	Nil.	Nil.	Nil.
October ...	—	—	—	—	—	—	—	—	—	—	Nil.	Nil.	Nil.	Nil.
November	—	—	1	—	—	—	—	—	—	—	Nil.	Nil.	Nil.	Nil.
December	1	—	—	—	—	—	—	—	—	—	Nil.	Nil.	Nil.	Nil.
TOTALS...	4	1	2	—	3	—	3	—	7	—	Nil.	Nil.	Nil.	Nil.

Admissions 19. Deaths 1.

N.B.—Boiling of sleeping mats began in November, 1910.

Now these tables possess a more than passing interest, because, indirectly, they throw a light on the etiology of the local beri-beri, which induces one not to accept, without question, the theory as to decorticated rice being the dominant cause of the disease.

In order to establish this point, I must shortly recall the leading views on the causation of beri-beri.

(1) A resolution was passed by the Far Eastern Association of Tropical Medicine in Hong Kong in 1912 to the effect that "the accuracy of the opinion of this Association recorded in 1910 has received further and more complete confirmation by investigators in Japan, China, French Indo-China, the Philippine Islands, Siam, Netherland's India and the Federated Malay States, namely, that beri-beri is associated with the continuous consumption of white polished rice as the staple article of diet."

(2) Fraser and Stanton, working in the Federated Malay States, have concluded that the phosphorus pentoxide content is an indicator of the beri-beri producing power of rice, when used as the staple article of a diet in man. Highet, in his experiments, found that a rice containing 0·42% of P_2O_5 could be safely consumed without causing beri-beri. Fraser and Stanton, however, concluded that 0·40% P_2O_5 was a safe figure.

Highet relied entirely on rice in his experiments. He did not bother about scraping walls or disinfecting rooms, all of which precautions had been adopted previously without affecting the incidence of the disease.

(3) The following small table gives some analyses of rice and shows the different amounts of $P_2 O_5$ in the various samples.

	Siam rice.	Rangoon rice.	Borneo Coy. undermilled.	Other undermilled rice.
	Percentages.			
Moisture	12·44	14·18	—	—
Protein	7·41	7·30	—	—
Fat	0·38	0·63	—	—
Carbohydrate	79·33	77·15	—	—
Ash	0·48	0·74	—	—
Phosphorus pentoxide ...	0·21	0·33	0·42	0·30

The above recapitulation represents shortly the rice theory. In other words, as long as you give your people a rice, which contains at least 0·42% of $P_2 O_5$ you will not get beri-beri among them no matter how dirty the walls, etc., and how close the contact of the healthy with the sick. That is the experience of observers in the Far East.

But beyond this, there is a school, say, of experience, in the middle East accustomed to meet with typical beri-beri among communities who are not confined to rice as a staple article of diet; these include crews of ships, troops, prisoners and so on. Arnold of St. Helena has recently called attention to this.* He cites the case of the Boer prisoners in St. Helena in 1901, amongst whom an epidemic of beri-beri broke out. Here rice formed no part of the dietary. Again he met with an American Whaling Ship, where out of a crew of 30 he found 11 to be suffering from beri-beri. Rice was not eaten.

Since that occasion Arnold has carefully gone into the history of every ship arriving at St. Helena with beri-beri on board, and he has found at least one of the following circumstances :—

(*a*) previous beri-beri on the ship,

(*b*) a member of the crew had previously suffered from the disease,

(*c*) a member of the crew had been exposed to infection on another ship.

There was an epidemic of beri-beri on one of H.M.'s Warships in the Persian Gulf in 1910, but I cannot quote details, as they are not to hand. In fact, if one went through the literature one could find numerous instances in which an epidemic of beri-beri had occurred absolutely independent of the consumption of rice. I have gone into the etiology of the "beri-beris" (I purposely make it the plural) because both theories have to be applied to our local conditions in investigating beri-beri in Zanzibar.

We find here :—

(1) Between 1907 and 1913 that there occurred 79 new cases of beri-beri with five deaths among prisoners and troops, of which number 64 cases with 4 deaths occurred previous to 1st January, 1911.

(2) The diet of these communities was never rice alone, although rice was the staple article.

(3) The class of rice consumed during the period under review was not polished rice, but the variety known locally as "takosa," which is unhusked.

In the preparation of the takosa for food it is hand husked and then boiled, but neither in the jail nor in the barracks is it ever heated by steam under pressure.

**British Medical Journal*, February 7th, 1914.

(4) Previous to August, 1912, the prisoners occupied an old jail which was bug* infested in the highest degree.

(5) In November, 1910, the Principal Medical Officer gave orders that the sleeping mats of all prisoners and troops should be boiled once a week. He demonstrated at that time that the prison cell walls harboured bugs in any quantity, that whitewashing, unless the walls were previously scraped clean and afterwards cemented, was useless ; he demanded that the cell walls should be cemented, and though this was done in the case of two cells, it was found to be too expensive to carry out the work for the whole jail.

(6) Following the cleansing methods adopted by Mr. MacDonald, the incidence of beri-beri fell in 1911, in the case of the prisoners, by nearly 40 per cent. whilst in the case of the troops no case at all occurred in 1912 or 1913.

(7) In conclusion, one is forced then to consider (*a*) the train of symptoms (making up a disease picture synonymous with the beri-beri of the Far East) as being in Zanzibar not dependent on rice, nor on a deficiency in the P_2O_5 content of the rice, (*b*) that the local beri-beri should apparently be regarded as an infectious disease and treated accordingly, that is to say, the sufferers should be segregated and their cells or rooms thoroughly disinfected with Clayton or hydrocyanic acid gas, (*c*) that there is some evidence in favour of the disease being conveyed by the bed bug, and therefore that all steps possible should be taken to get rid of such bugs as already exist in crevices in walls and in the woodwork of doors, by having the walls cement-rendered and the woodwork treated with creosote.

(8) With regard to the facts relating to beri-beri in Zanzibar, I propose during 1914/1915 to undertake, as occasion arises, some experimental work on the possibility of the bed bug being a transmitter of the disease.

SOME NOTES ON THE GEOLOGY OF ZANZIBAR.

By A. G. Carment, M.D., B.Sc.

In response to a request by the Medical Officer of Health I have compiled the following short note on this subject. I think everyone will agree, that apart from the interest it stimulates in the locality in which one's work is placed, the geology of the district is really of public health importance.

There can be no doubt in my mind after a very fortunate tour of both Islands that they might afford the ideal seat for the thrilling stories of our boyhood.

There is the magic of the coral-reef and its eternal breakers, the calm lagoon, the forbidding coral cliff and the impenetrable scrub. It requires no stretch of imagination to ponder over the thrilling acts of bygone days, of treasure buried and still undiscovered.

Darwin's theory as to the formation of coral islands with their fringing roofs and smooth lagoons held the field for many a day until the eventful voyage of the "Challenger" under the direction of Sir John Murray.

It is my opinion, that Zanzibar and Pemba have been formed by a process of upheaval, rather than subsidence, so that Sir John Murray's theory holds good for the Pearl of the Indian Ocean and its sister Island Pemba.

I believe also that these Islands are still slowly rising out of the ocean, as evidenced by the water-worn, undercut cliffs of the east coast of both of them. This appearance could only have been caused by the action of the waves beating on the shore, and now there is calm water between the shore and the breakers on the fringing reef ; which is about a mile from the shore.

---

* Cimex rotundatus.

On both Islands there is a layer of sedimentary deposit which is more marked in Pemba than in Zanzibar; and from the nature of the rock (a hardened shale) encountered in some parts of Pemba, as seen in the sinking of wells, one looks to volcanic action as aiding in the raising of the Islands out of the sea.

These Islands, at least Zanzibar, were at one time at the bottom of the estuary of a large river, whose ancient banks can still be seen on the German East African Coast just opposite, and whose source in all probability was in the region of Kilimanjaro.

Some of the most interesting Geological specimens found on these Islands are:—

Quartz crystals on coral rocks.
Calcite crystals on coral rocks.
Calcite in large crystals and also filling veins in basalt rock.
Crystalline coral.
Iceland spar.
Mica, foliaceous and crystalline.
Ironstone, various.
Red and white sandstone.
Red and grey granite.
Pegmatite.
Gravel beds containing:—Garnets, white and grey sapphires, small amethysts, tourmaline (black variety) and agate.

These specimens have been examined macroscopically, microscopically and chemically.

On some parts of the Island beach may be found pumice stone and peculiar beads, the latter evidently an offering to the sea of former dwellers on these Islands.

Believing in the axiom of that great thinker and astronomer Sir John Herschell, which states that the man who never attempted to formulate a theory on any recondite subject, whether ultimately correct or not, cannot hope to make any advancement, having also read the interesting life history of a pebble on the shores of the Forth, by Professor Geikie of Edinburgh, I will attempt to show how these Islands were formed.

As mentioned above, the first scene was a wide estuary, shown by the presence first of sandstone which out-crops in both Islands, and secondly of shale found in the sinking of well shafts.

When these layers came to a distance of about 100 feet from the surface of the water, then the coral began to grow. As this growth gradually reached upwards, it is possible that volcanic action helped to some extent raising the coral out of the sea. This is evidenced by the hardened character of the sandstone and shale.

There must, however, have been a period of subsidence following, as clay beds and other sedimentary gravel deposits of considerable thickness are superimposed on the growing coral, in irregular patches at the present time.

From a public health point of view probably Zanzibar stands by itself by providing an unrivalled water supply which need not be filtered nor boiled before drinking.

It is undoubtedly very hard, owing to its springing up through the coral rock, and it contains a certain acidity due to the presence of CO_2, thus making it inimical to the group of dangerous water borne organisms.

In many parts of both Islands ancient Arab or Persian wells, some round and others square, have been sunk through the solid coral rock to a depth in some cases of 60 or 80 feet.

3. A NOTE ON AN OUTBREAK OF DENGUE FEVER AND SOME REMARKS ON FILARIASIS.

By R. Howard, M.A., B.Ch., M.D. (Oxon).

In the Tropical Diseases Research Fund Report for Zanzibar for 1912, six cases, which occurred in the Universities Mission Hospital, were returned as Dengue. It is true that Zanzibar is recognised as one of the epidemic centres of Dengue, but in the year 1911 there was no epidemic, and as these cases are the only ones recorded during the year it may be well to enumerate the symptoms which led to my diagnosis of sporadic Dengue.

Five of the cases occurred within a period of five weeks, February 7 to March 14, and during this period all the nurses living in the Mission Hospital were attacked. They were all taking regular prophylactic quinine ; in no case did an examination of the blood show any Malarial parasites, nor were any of the cases typical of Malaria. Culex fatigans were, however, very abundant in the neighbourhood.

As far as is known Phlebotomus does not exist in Zanzibar ; hence the cases cannot have been three days fever, or Phlebotomus Fever.

It is, therefore, difficult to see under what heading these cases of short pyrexia should be placed, unless under that of sporadic Dengue. Evidence seems to be accumulating that sporadic and atypical cases do occur apart from regular epidemics, and many authorities consider that the so-called seven-day fever of Calcutta is of this nature.

Case 1.—The most typical case was that of K.H. The onset was quite sudden on February 22nd ; the temperature rose to 101° with a good deal of pain and headache, but with a pulse of only 72. The following day there was a remission to 99·6 with a great deal of back pain. Next day, February 24th, about the same, but with intense local tenderness, especially in the back, so that the patient could not bear to be touched.

On February 25th, the temperature rose from 99° to 100·6 with the same intense tenderness, but in the abdomen, and a distinct papular rash appeared, which faded on pressure.

On Febuary 26th, the rash was more marked, but the patient felt better ; temperature 99°, running to 100·4.

On February 27th, temperature 99°, the rash was fading and patient was convalescent, although accompanied by weakness and anorexia.

Case 2.—M.J.K. The onset was marked by acute œdema of the eyelid, and an urticarial rash over the body.

On February 7th, the temperature rose to 101°.

On February 9th, there was a slight remission of the fever to 100°.

On February 10th, the temperature rose to 101° and the acute œdema went down, leaving intense aching pain, especially in the hands and feet.

Case 3.—M.D. Onset absolutely sudden in the middle of a meal. Patient felt ill and giddy and went to bed, and in an hour was quite delirious. Temperature only 100°. Face flushed. Next day, temperature 99·4, some œdema of eyes, hands and feet ; pulse slow. On the third day the temperature was normal, but pulse was slow in regaining strength.

Cases 4 and 5.—Were marked with low fever, which lasted four or five days, with severe back pain, but no other symptoms.

Case 6.—C.E.A. This occurred nearly three months after the other cases in a new member of the Mission within a month of his arrival in the Island.

There was a severe attack of pyrexia lasting a little over three days, with intense headache and severe back pain. The pulse was slow throughout, never rising above 84°, even with a temperature of 101·6. There was no enlargement of the spleen, and no malarial parasites could be found in the blood.

FILARIASIS.

Of the mosquito-borne diseases present in the town of Zanzibar it would appear that Filariasis is responsible for the greatest amount of ill-health and suffering. Cases of Elephantiasis are of frequent occurrence, as also are Filarial Lymphangitis and abscess. Varicose lymph glands and lymph scrotum are not uncommon.

Roughly speaking, one in every five of the patients admitted to the Mission Hospital are found to be infected with Microfilaria.

The following figures refer to a series of consecutive admissions during a portion of each of three years :—

1911	Number examined	55	Number infected with microfilaria nocturna	16
1912	,, ,,	53	,, ,, ,, ,, ,,	5
1913	,, ,,	51	,, ,, ,, ,, ,,	14
Other cases where the blood has been been examined		68	,, ,, ,, ,, ,,	14
		227		49

Percentage 21·5.

In all cases a single examination of a thick blood film taken between 8.30 and 9.0 p.m. was made. Had examination been made at a later time and more frequently, doubtless a larger number of infections would have been found ; so that it is certainly not overstating the case to say, that at least one in five of the inhabitants of Zanzibar are infected.

The great majority of the cases in which microfilaria were found showed no gross filarial lesion. They were typical cases in apparently good health and are the most important agents in spreading infection. As would be expected the poorer class of people, who sleep in crowded rooms unprotected by mosquito nets, show a much higher percentage of infection than those more comfortably circumstanced. No special racial predilection was observed ; the poorer Indians are as badly infected as the Swahilis.

It may be mentioned that no case in which Elephantiasis had developed showed microfilaria in the blood.

ZANZIBAR PROTECTORATE.

Economic Zoology Report.

FOR THE YEAR 1913.

BY

W. M. ADERS, Ph.D.

PART VI.—ECONOMIC ZOOLOGY.

BY W. M. ADERS, PH.D.

The work of this department can be divided as follows :—

		PAGE
1.	Entomology in relation to Public Health and Medicine	76
2.	Entomology in relation to Veterinary Science	83
3.	Entomology in relation to Agriculture	84
4.	Oysters in relation to Pearls	94
5.	Economic Fish	96
6.	Birds, beneficial and otherwise	96
7.	Helminthology	97
8.	Blood parasites of mammals, birds, reptiles, &c.	97
9.	Museum of the Department	98
10.	Travelling	98
11.	Special Work	99
12.	Conclusion	101

NOTE.—The page numbers are those of the Medical and Sanitary Report of the Zanzibar Protectorate for the year 1913.

ENTOMOLOGY IN RELATION TO PUBLIC HEALTH AND MEDICINE.

ORDER DIPTERA (FAMILY CULICIDÆ).

Ever since my arrival in the Protectorate a mosquito brigade has been employed fighting against these pests.

This section of the Public Health Department has worked out the different species.

The following have been identified :—

Anopheles costalis, Lw.
Anopheles funestus, Giles.
Stegomyia funesta, F.
Culex fatigans, Wied.
Culex tigripes, Grp.
Culex invidiosus, Theo.
Culex guiarti, Blanch.
Skusea pembænsis, Theo.
Mucidus mucidus, Karsch.
Toxorhynchites brevipalpis, Theo.
Tæniorhynchus fuscopennatus, Theo.
Mansonioides uniformis, Theo.
Ochlerotatus irritans, Theo.
Mimomyia mimoyiaformis, Newsi.
Eretmopodites chrysogaster, Grah.

The common anopheline of Zanzibar town is Anopheles costalis.

The seasonal prevalence of these mosquitoes is shewn in the M.O.H. Report, page 42, Table 19.

The following districts have been visited :—

Muyuni swamp, large numbers of A. costalis and Culex fatigans were taken, larvæ of both varieties were found breeding in the swamp. This district is a well known Malaria haunt.

Mwera Swamps. At Kimara, larvæ of A. costalis and Culex fatigans were captured.

In the backwaters of the Mwera stream many larvæ of A. costalis have been found from time to time.

THE ISLAND OF TUMBATU.

Contrary to my expectations, large numbers of A. costalis were found. The island is badly supplied with water, wells being few in number. On closer inspection the coral pockets, which are existent all over the island, were found to be swarming with larvæ.

Stegomyia fasciata was found breeding around the villages.

THE ISLAND OF MWANA MWANA.

Here also larvæ of A. costalis were found.

The results of these investigations show that A. costalis, Culex fatigâns and Stegomyia fasciata are prevalent throughout the Island of Zanzibar and the adjacent small islands.

PEMBA ISLAND.

This has been visited on three separate occasions.

Owing to the large number of swamps mosquitoes are much in evidence. As in Zanzibar the three common forms are A. costalis, Culex fatigans and Stegomyia fasciata. At Weti, Tæniorhynchus fuscopennatus is common. Anopheles funestus abounded at Tundaua, large numbers of larvæ were found breeding in the rice swamps.

During the year 1913 all mosquito inspectors were taught to identify the three common types of larvæ, viz. :—Culex, Stegomyia and Anopheles.

We propose during the year 1914 to collect numbers of adult mosquitoes in certain quarters of the town. The Anophelinæ will be dissected and examined for sporozoites.

ENEMIES OF MOSQUITO LARVÆ.

During 1912, a consignment of fish (Haplochilus playfairii) arrived from the Seychelles. They proved to be voracious feeders on mosquito larvæ. Nearly all the permanent swamps of Zanzibar have been stocked ; it is too early to draw any conclusions as regards their efficacy. A number have been sent to Pemba, where they will be placed in the permanent swamps. Near the mouth of several fresh water streams large numbers of young mullet (Mugil sp.) and Sea Perch (Ambassis commersonji) have been taken. In aquaria these latter proved to be rapacious feeders on mosquito larvæ ; they are, however, unable to live in any water which is sluggish or badly oxygenated.

Among aquatic insects inimical to mosquito larvæ Dragon-fly Larvæ and Nepidæ are abundant in all swamps.

FAMILY CHIRONOMIDÆ.

Ceratopogon sp. Numbers of these minute flies were prevalent on Prison Island during the hot months. Careful search was made for larvæ but none have been found. Suspicion rested on certain pits, in close proximity to the main bungalow, being filled with rotting vegetation and damp soil; the sides of these latter showed many crevices full of earth and moss.

The Medical Officer of Health had the larger ones filled up with sand, since this measure was completed fewer complaints have reached us of these troublesome pests. These flies have also been captured on the beach at Chukwani.

ORDER SIPHONAPTERA. (FAMILY PULICIDÆ)

Large numbers of fleas have been collected from the three common town rats of Zanzibar (Epimys norvegicus, Mus rattus and Mus alexandrinus).

They all proved to be Xenopsylla cheopis, Roths.

The Bandicoot (*Mus bandicota*) harbours large numbers of Xenopsylla cheopis, from one specimen 46 were obtained.

The common shrew of Zanzibar town (Pachyura murina) harbours few Xenopsylla cheopis.

Ctenocephalus canis.—On dogs and in houses in Zanzibar.

FAMILY SARCOPSYLLIDÆ.

Dermatophilus (*Sarcopsylla*).—Penetrans, L. Very common throughout the Island.

Echidnophaga gallinacea Westw.—Very common on fowls.

During the year 1914 collections of rat fleas will be made monthly, these will be identified and tabulated.

ORDER ANOPLURA.

FAMILY HÆMATOPINIDÆ.

Hæmatopinus tuberculatus, Nitzsch.—Many specimens have been found throughout the year on domesticated buffaloes.

Liognathus sp.—Taken on Duiker antelope.

Liognathus sp.—From a human being.

FAMILY PEDICULIDÆ.

Pediculus humanus, L.—Are common pests amongst the natives.

Phthirius pubis, L.—From natives.

ORDER HEMIPTERA.

FAMILY CIMICIDÆ.

Cimex lectularius, L.—This insect is exceptionally met with in Zanzibar. I obtained a few specimens from a Goan who had resided for some years in the town.

Cimex rotundatus, Sign.—Is to be found everywhere throughout the two islands. At times they are a veritable scourge in the prisons. Fumigation with Clayton gas has given excellent results.

ORDER DIPTERA.

TABANIDÆ.

The species met with are as follows :—

Tabanus tæniola. P. de B.—This is the commonest Tabanid in the two Islands, being found everywhere. They often attack man, flying on board the Pemba mail in Chake-Chake creek and inflicting severe bites on the passengers and crew. When alighting on cattle they nearly always select the lumbar region, seldom the legs. Engorgement average, 2½ to 3 minutes.

In mixed herds of cattle and buffaloes the latter are always singled out for attack, as they seem more callous to their bites.

I have never taken them from goats or sheep.

Tabanus tæniola, P. de B., var. Variatus.—This form has only been taken occasionally, the typical T. tæniola being the common form.

Tabanus fraternus, Macq.—A very common form, being found throughout the two islands. Like T. tæniola, they often attack man. Feeding habits on cattle as T. tæniola.

Tabanus conspicuus, Ric.—A rare form, only one female has been taken.

Tabanus biguttatus, Wied.—A common form. Nearly always captured on the hump of cattle, seldom attacking any other part. Engorgement in some cases took 4½ minutes. Males were captured on tree trunks in proximity to grazing grounds.

Tabanus Par, Walk.—This small species has a wide distribution throughout the two islands. Nearly always taken on the withers and hocks of cattle.

Tabanus thoracinus, P. de B.—A very rare form, our collection only contains four specimens.

Tabanus Africanus, Gray.—By no means a common form, prevalent during the rainy season in low lying districts ; during the dry season very few were obtained.

Tabanus gratus, Lw.—Large numbers have been taken at all times of the year.

Tabanus ditæniatus, Macq.—Is nowhere very abundant, seven specimens captured during the rainy season.

Tabanus leucostomus, Lw.—Represented by two specimens both females, in comparison to other Tabanids it is a very rare form.

Tabanus producticornis, Aust.—One specimen was captured on the sea-shore near a mangrove swamp.

Tabanus albipectus, Big.—Two specimens obtained from a sandy bank near the sea-shore.

GENUS ÆGOPHAGAMYIA.

Ægophagamyia pungens, Aust.—A common form on the sea-shore near Zanzibar. They have been taken at various points on the coast, viz. :—Bwloo, Ugugaku, Mchamgamle, Mkunduchi and Chwaka. A dry sandy beach seems very attractive to them, I have never found them inland.

Their favourite food is goat's blood ; there are no records of their attacking man.

Genus Silvius.

Adersia œstroides, Aust.—Similar in its habits to Ægophagamyia ; large numbers of males and females have been found in close proximity to cattle carcases. Never known to bite man.

Genus Hæmatopota.

Hœmatopota decora, Walk.—The only form from Zanzibar. Persistent throughout the whole year in both islands. Generally feeding on hocks and withers of cattle. Engorgement average, 2½ minutes. This insect lives well in captivity, and has been used on many occasions for transmission experiments.

Genus Chrysops.

Chrysops longicornis, Macq.—A very common form in both islands, persistent throughout the year. Many specimens were taken at Tundaua, Pemba, in a deep shady valley. As many as 30 have been captured on one donkey in a few minutes, the withers and hocks being smothered. Engorgement took 3 minutes ; once they have started feeding nothing disturbs them, they, literally, have to be brushed off. Fully engorged specimens are very slow of flight, proceeding a few yards, then settling on any convenient foliage. They readily attack man, inflicting a painful wound around the ankles.

The following is a chart showing the seasonal incidence of the common Tabanidæ. In all cases the collections were made from two water-buffaloes, two hours being devoted to collecting. The majority were obtained from the Bububu district.

CHART SHOWING THE SEASONAL INCIDENCE OF THE COMMON TABANIDÆ.

Tabanidæ.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
T. fraternus	28	18	—	33	30	20	19	14	13	12	5	18
T. tæniola	13	14	—	46	95	22	22	13	4	19	12	5
T. Par	3	1	—	17	17	9	10	1	1	9	5	4
T. gratus	3	2	—	4	11	9	10	2	2	2	8	1
Hæmatopota decora ...	5	2	—	2	4	6	3	—	3	4	—	—
T. biguttatus	3	—	—	4	2	6	4	—	—	—	1	1
T. Africanus	—	—	—	4	3	1	1	—	—	—	—	1
T. leucostomus ...	—	—	—	—	1	1	—	—	—	—	1	—
T. ditæniatus	—	—	—	—	—	2	—	—	—	3	—	—
Chrysops longicornis ...	—	—	—	—	1	3	3	—	—	—	—	1
T. conspicuus	—	—	—	—	—	1	—	—	—	—	—	—

RAINFALL.

January ...	0·39	July	0·31
February ...	1·37	August ...	0·88
March ...	9·99	September ...	2·58
April ...	17·59	October ...	4·22
May	11·18	November ...	3·20
June	0·07	December ...	1·31

During March I was absent in British East Africa.

It shows clearly that the Tabanidæ appear in great numbers after the rains, *e.g.*, May, June and October.

Ideal weather conditions are slight showers of rain with sunny interludes, on such a day the bag is always full. During heavy rain or high wind they are conspicuous by their absence.

Repeated attempts have been made to keep Tabanidæ in captivity, on a few occasions T. tæniola and T. fraternus have survived for eight days, kept singly in glass tubes with some moistened paper. They were fed on sugar solution and citrated blood. After two days in captivity they refused to bite experimental animals.

FAMILY MUSCIDÆ.

Stomoxys calcitrans, L.—This species practically occurs everywhere in the neighbourhood of cattle. Larvæ have been found in quite recent moist droppings ; manure pits swarm at all times of the year with larvæ and pupæ.

Animals somewhat out of condition are especially singled out for attack, a useful sign when looking over a herd for a suspected Trypanosome case. In such cases Musca domestica feeds in association with Stomoxys, licking the old Stomoxys wounds.

Stomoxys nigra, Macq.—Not as common as S. calcitrans, but has been taken all over the two islands.

Both species of Stomoxys readily attack man, inflicting irritating wounds around the ankles.

Lyperosia minuta, Bigot.—These small Muscidæ are somewhat local in their distribution. Specimens were captured on Prison Island and at Bwleo. At the latter place the cattle were covered. They seem particularly fond of exposed windy positions.

Cordylobia anthropophaga, Grun.—Several larval specimens were sent by the P.M.O. obtained from human boils, others have been found in dogs, rabbits and guinea-pigs, always associated with pus formation.

Average pupal stage is 19 days.

MARKET FLIES.

MUSCIDÆ.

Zanzibar town is remarkably free from these filthy feeders. The following have been taken and identified :—

Pyncosoma putorium, Wied.—The commonest fly in the public markets, numbers can always be taken around the fish and meat stalls.

Pyncosoma marginale, Wied.—Not so numerous as the former, but especially attracted by meat ; also taken at several points in the Island.

Both these species of Pyncosoma are to be found associated with human ordure.

Pyncosoma albiceps, Wied.—Represented by a few specimens in our collection.

Musca domestica.—Ubiquitous in both islands. Manure pits are always swarming with larvæ and pupæ. Occasionally found breeding in human ordure.

Sarcophaga sp. incert.—Large numbers are always to be obtained around native cess-pools. They are particularly fond of depositing their larvæ in any rotting meat ; they have also been found in rat carcases.

Drosophila sp. incert.—These small flies, conspicuous by their red eyes, are always found hovering over fermenting fruit; eggs, larvæ and pupæ occur in abundance in such a nidus. They have also been noticed alighting on meat and human excrementa. Many other Muscidæ have been captured, but are still unidentified. Specimens will be taken home for comparison with known types.

INSECTS INJURIOUS TO STORED GRAINS.

In the tropics where insect food is abundant throughout the year, these grain destroyers are more in evidence than in Europe. Owing to the custom of storing grain in loose receptacles and exposing it in open bins for sale, nearly every sample examined showed evidence of insect attack. In some cases the grain showed fungi, evidently secondary to insects. It is of importance that the most dangerous of our local forms should be identified, as there is no control in Zanzibar regarding the importation of seeds, cereals, etc.

The commonest insects injurious to stored grain are as follows:—

Calandra oryzac, L.—A small, reddish brown weevil, from 3–4mm. long, with a long bent rostrum, body punctuations even and fine. Two light brown spots are present on each elytron, a good distinguishing mark.

Breeding habits. The eggs are laid in small holes in the grain eaten out by the females; the larvæ feed in the kernels, pupating in the shells of the demolished grain. The life cycle is probably not more than one month. These weevils have been found in rice, maize, sorghum and Pennisetum typhoideum.

Læmphlocus pusillus, F. (*Fam. Cucujidæ*).—A very small brown beetle, about 1½mm. long, characterised by long antennæ. Abundant in maize.

Trilobium ferrugineum, Fabr.—Sometimes known as the red grain beetle, very common in maize and rice.

Silvanus surinamensis, Fabr. (*Fam. Cucujidæ*).—The saw-toothed grain beetle. It is a small, brown, flattened insect, about 2·5mm. long, the thorax is armed with spiny processes. Has been taken in maize.

Bruchus sp.—Very common in seeds of leguminous plants; they have been taken from peas (*Pisum sativum*), lentils (*Ervum lens*), pigeon pea (*Cajanus indicus*), and haricot (*Phaseolus vulgaris*).

Ephestia cautella, Wlk.—The larvæ of these small moths are abundant in rice, producing a quantity of silk in which they form galleries of webbing. On looking at a sample of infected rice, numbers of grains will be found adhering together by silken threads. The larvæ pupate in these silken tunnels.

Before closing this section on Medical Entomology I should like to add some negative results.

Ornithodorus moubata.—Has never been taken, although common in B.E.A. and G.E.A. Huts inhabited by natives recently arrived from the mainland have been carefully inspected. The medical officers assert that no cases of relapsing fever have been admitted to hospital.

Auchmeromyia luteola.—No records.

Simuliidæ.—No specimens have been obtained. Owing to the absence of high hills and rapidly moving rivers we may perhaps assume we are free.

Psychodidæ.—No blood-sucking representatives of this genus have been taken.

SECTION II.

ENTOMOLOGY IN RELATION TO VETERINARY SCIENCE.

ACARINA.

As in all tropical countries ticks are everywhere in evidence. The following list has been compiled :—

Rhipicephalus appendiculatus, Neum.—One of the commonest species, being present on all cattle.

Rhipicephalus simus, Koch.—Common on cattle.

Rhipicephalus sanguineus, Latr.—Taken on dogs.

Rhipicephalus evertsi, Neum.—Very common on cattle and goats. Generally found around the anus or in the ears.

Rhipicephalus pulchellus, Gerst.—A rare form in Zanzibar. Numbers can be found on cattle imported from the Benadir Coast. They do not seem to have obtained a foothold on the island.

Amblyomma hebræum, Koch.—On cattle.

Amblyomma variegatum, F.—Common on cattle in Zanzibar Town, seldom met within the interior ; Tumbatu Island proved an exception, a number being obtained from the local herds.

Boophilus decoloratus, Koch.—Abundant everywhere on cattle.

Hæmaphysalis leachi, Aud.—On dogs.

Hyalomma ægyptium, L.—Only one specimen in our collection. A noticeable feature in Zanzibar is, that the local inland herds carry few ticks in comparison to the town ones ; this may be due to the large number brought in from the Benadir Coast.

These latter are always smothered with ticks ; as mentioned in the M.O.H.'s Report on the Veterinary Division, a dipping tank at Pigaduri Quarantine Station would do much to improve matters. At the same station Tabanidæ and other blood-sucking Muscids are always to be found. For this reason a fly-proof stall should be erected for Surra suspects, as Tabanidæ are supposed to be the carriers of T. evansi.

DIPTERA.

The Tabanidæ and blood-sucking Muscidæ have been enumerated in the section on Entomology in relation to Public Health and Medicine.

Family Hippoboscidæ.

Hippobosca maculata, Leach.—Common on cattle, horses and donkeys. These flies are often met with in the town, seldom being found inland. The number of Hippoboscidæ taken has been suprisingly few ; I am of the opinion that a moist damp climate like that of Zanzibar is inimical to their development. In dry countries, like the Soudan and Egypt, this family is one of the commonest.

Lynchia maura, Bigot.—Common on domesticated pigeons. Numbers of wild pigeons and doves have been examined with negative results.

Fancy pigeons, such as Fantails, are always more heavily infested than the common breed owned by natives.

FAMILY TACHINIDÆ.

Oestrus ovis.—Larvæ of this species have been obtained from the frontal sinuses of goats ; in some cases they had penetrated into the horn. Pupal stage average 19 days. From time to time the Veterinary Officer has called my attention to bots in the stomach of cattle and donkeys. Collection of fæces (from presumably infected animals) have been kept under observation, but no pupæ could be found. Immature larvæ, collected from the Abattoir, died before pupation. This work will be continued in 1914.

NYCTERIBIIDÆ.

Cyclopodia greeffi, Karsh.—These degenerate parasitic Diptera are common on flying foxes (*Pteropus vœltzkowi*).

SECTION III.

ENTOMOLOGY IN RELATION TO AGRICULTURE.

INSECTS INJURIOUS TO COCOANUTS.

Rhinoceros Beetle (*Oryctes Monoceros* and *Oryctes boas*).—These two species are still everywhere much in evidence, and are undoubtedly a most serious menace to the cocoanut industry. A decree has been recently formulated to deal with this matter.

On the advice of Mr. T. Anderson (entomologist to the B.E.A. Protectorate) several traps have been prepared ; some months must elapse before results can be obtained.

Oryctes monoceros is the commoner form, larvæ and pupæ abounding in decaying cocoanut trunks ; O. boas more generally breeds in manure heaps.

The beetle is more injurious to young palms of 3 to 4 years old ; if they survive this dangerous period the attack does not seem to cause such serious damage. Many young trees are killed outright, older trees are better able to withstand attack, but after repeated invasions become unproductive. As regards the length of the life-cycle no accurate records have been obtained, larvæ have been kept in captivity for over three months. Pupæ are not often found ; the few obtained were discovered in old rotting trunks in association with larvæ.

No methods of extermination have been tried, except the above mentioned decree and traps.

Larvæ and adults of Oryctes monoceros have also been taken in sugar cane.

One Sisal plant (*Agave sisaliana*) was found showing evidence of attack, several of the fleshy leaves showing typical oval holes and frass ; beetles were not found. In certain heavily manured gardens enormous numbers of larvæ (*Oryctes boas*) were dug up ; the roots of ornamental plants had been damaged.

" Bud Rot " is apparent in many plantations, and I am inclined to think is secondary to beetle attack. On opening a diseased crown a large quantity of evil-smelling liquid exudes, many Muscidæ were attracted to the spot and eagerly lapped up the exudate. The Muscidæ in question still await identification. These flies may be a factor in spreading the disease. Seedling nuts are sometimes attacked by Termites, being completely ruined. The owner was advised to soak his nuts in Cooper's Dip before planting and better results were obtained. A peculiar blistering and wrinkling of nuts has been observed ; all sizes are attacked, a resinous discharge exuding from the blisters. On several occasions around these cracks small weevils (*Calandra stigmaticollis, Gyll.*) were found ; in all probability adventitious.

Specimens and photographs were sent to Mr. Petch, Mycologist to the Ceylon Agricultural Department.

Nuts have been received in which the outer husks were smothered with a small scale (*Aspidiotus sp.*), the leaves were not attacked.

CLOVES.

Fortunately, no pests have been discovered, but it is apparent in many plantations that several trees are dead or in a dying condition. The cause still remains to be explained, all the evidence points to certain physiological conditions, such as waterlogging of the roots near swamps, denudation of alluvial soil on slopes, or the tap root reaching to an impervious layer of sandstone.

On these unhealthy trees Termites (*Termes bellicosus*) had attacked the bark, the dead branches were also infested with Bostrychids.

Several young live clove trees in Pemba have been killed by Termes bellicosus, feeding on and gnawing the bark of the lateral roots.

COTTON.

The following varieties were grown in the experimental garden attached to the Health Office, viz. :—Egyptian—Abassi, Nubari, Yannovitch, Mit Affifi, Asili, Sakellaridis. American—Allen's Long Staple, Sunflower, Cavaronica. From the outset all varieties were heavily parasitised. The following were noted and studied.

LEPIDOPTERA.

Gelechia gossypiella.—Saunders. The Pink Cotton Boll Worm. Is by far the most serious pest, every variety being attacked. All stages were taken throughout the year ; the life-history is well known. In every instance pupation took place in eaten out seeds, eggs were found on the sepals and leaves. Average length of life-cycle is 25 to 30 days.

Larvæ have also been found in the pods of the silk cotton tree (*Eriodendron anfractuosum*) and feeding on the seeds of Hibiscus esculentus ; these latter are always heavily infested. On carefully examining the unripe bolls a small hole is visible. This is the entrance hole of the young larvæ, the orifice is circular and quite clean, in contrast to that of Earias insulana.

By picking all such attacked bolls a great diminution was effected.

Earias insulana, Boisd.—The Egyptian Cotton Boll Worm. Has been rarely met with on cotton ; numbers of larvæ have been obtained from Hibiscus esculentus, the entrance hole of the larvæ being large and surrounded by a mass of dark frass. Pupæ on stem of plant or on the ground.

Sylepta derogata, F.—The Cotton-leaf Roller.

The larva cuts and rolls the leaves, many larvæ live in one shelter. The eggs are laid on the underside of the leaf; the newly hatched larva feeds for a short time on the epidermis of the leaf, before spinning a shelter.

Pupation takes places in the rolled leaf.

Control methods. Pinching the rolled leaves has given quite satisfactory results.

Parasites.—Chalcidæ have been obtained from larvæ.

Gelechia sp.—Leaf Miner.

Throughout the season all experimental cotton was much infested. The leaves in many instances being covered with concentric tunnels. The young larva is white with a brown thoracic shield measuring 1½ mm.; later it becomes pink, being a conspicuous object beneath the epidermis; average measurement 3 to 4 mm.

Pupation takes place on the dorsal side of leaf in an oval silken case.

Pupal stage averages five days.

Pyroderces simplex, Wlsm.—This small boll-worm has been occasionally found. The larva is smaller and darker than that of Gelechia gossypiella.

Pupa brown, in lint.

Prodenia litura, F.—Egyptian Cotton Worm.

Very few specimens have been obtained from cotton; it has also been found on young tobacco plants, castor-oil, and Hibiscus esculentus.

Porthesia producta, Walk.—Occasionally found swarming on cotton; the larvæ are more or less omnivorous, moving from one food plant to another. Numbers were taken on castor-oil, which seems their favourite food.

Orgyia vetusta, Hmp.—One small swarm of larvæ appeared during the year, completely defoliating the attacked plants.

RHYNCHOTA.

Cotton Stainers.

Dysdercus fasciatus, F.—Cotton lint stainer. These stainers were prevalent during the bolling season, and caused much damage to the lint. All varieties of cotton were attacked, especially Cavaronica. These insects were observed plunging their probosces into the young oily seeds, and staining the lint with their excrementa.

Eggs were found under small clods of soil, the plants had been screened for experimental purposes.

Food plants are as follows:—Cotton, Hibiscus esculentus, Eriodondron anfractuosum, Baobab Tree (*Adansonia digitata*). Enormous numbers of adults and larvæ were found in the fruit of the latter tree. They are also fond of sucking the juices of mammalian carcases; skins and skulls put out to dry were covered.

Dysdercus superstitiosus has also been taken from time to time on cotton.

Control Measures.—Hand collecting was tried, the insects being swept into a small pail containing kerosine; this entailed a considerable amount of labour. Split Baobab fruits were placed between the rows, large numbers congregated on them; these were tipped into a pail. This latter method worked well on our small experimental plot.

Oxycarenus albidipennis, Stol.—The Black Cotton stainer.—They are generally found on well matured bolls, in which they breed and feed.

In neglected crops they occur in vast numbers. The actual damage done seems to be of a doubtful character ; owing to the numbers present the seeds must be injured.

COCCIDÆ (SCALE INSECT).

Dactylopius obtusus, Newst.—A most serious pest of cotton, the commonest Coccid in Zanzibar. This species seems almost an omnivorous feeder. Many experimental plants were completely covered, the main stem being hidden.

Control Measures.—Kerosine emulsion gave good results. Larvæ of Exochomus nigromaculatus, Gœze, were taken frequently feeding on these Coccids. No Hymenopterous parasites have been obtained.

APHIDÆ.

Aphis sp.—Young plants from two to four months old were attacked. Spraying with nicotine was efficacious ; larvæ of Syrphidæ were much in evidence feeding on these insects.

COLEOPTERA.

Syagrus sp.—Common in open cotton bolls. Apparently causing no damage.

INSECTS INJURIOUS TO CEREALS.

MAIZE (*Zea Mays.*)

Extensively grown throughout the two islands, the following harmful insects have been obtained.

LEPIDOPTERA NOCTUIDÆ.

Cirhpis loreyi Dupon.—Found in all maize fields ; larvæ boring in main stalk and in base of cob, occasionally feeding on the unripe seeds. Pupation either in stalk or in cob. The moist white excrement, very typical of the presence of larvæ, is generally found at the base of the leaves or cob. The large exit holes of the imagos are also easily detected. Life cycle averages 19 to 23 days.

Sesamia calamistis, Hmp.—Similar in habit to the former.

PYRALIDÆ.

Chilo. sp.—The commonest borer of maize, in some fields 50 per cent. of the crop was ruined.

As it is impossible to persuade the natives to burn stubble, generation succeeds generation. In old abandoned maize fields hundreds of pupæ can be collected.

No control measures have been tried ; experimentally large numbers of adults were attracted to light traps.

HESPERIIDÆ.

Parnara mathias, F.—Taken occasionally feeding on leaves of maize. By no means a serious pest.

FULGORIDÆ.

Gen. and incert.—Very prevalent on maize imported from British East Africa (Hickory King), swarming at the base of the leaves.

Control Measures.—Sprinkling ashes and lime on the infected leaves gave satisfactory results.

MILLET (*Sorghum Vulgare*).

Cirphis loreyi, Sesamia calamistis, and Chilo sp. were abundant in the millet areas.

Busscola fusca, Hmp.—Larvæ and pupæ were found in main stalk. Other cereals are Pennisteum typhoideum and Eleusine coracana; no parasites have been recorded, as they are not grown in any quantity.

INSECTS INJURIOUS TO MARKET GARDENS.

PYRALIDÆ.

Crocidolomia binotalis, Zell.—Cabbages are heavily infested with larvæ of this species. Several crops were completely ruined. The larva is green with median and lateral white stripes, a black prothoracic shield and three black dots on the side of each segment; at maturity they measure $\frac{3}{4}$ in. Pupæ are found on the leaf under a slight silken web, or in the rolled end of leaf. Pupal stage 11 days. Other food plants are turnip, watercress and nasturtium.

Phytometra signata, F. (*Noctuidæ*).—Large green looping larva. Pupa on leaf protected by a heavy silken web. Never very plentiful. Other food plants are turnip and lettuce.

Control Measures.—Hand picking and spraying with hot water gave good results.

RHYNCHOTA.

Acanthocoris fasciculatus, F.—Egg plants (*Solanum melongena*) were badly infested. In small plots hand picking was resorted to; no other control measures were attempted. In one garden a few were captured on chillies (*Capsicum sp.*).

TRYPETIDÆ.

All varieties of Cucurbitaceæ are attacked by these flies.

Dacus sp.—Native gourds are severely affected. Larvæ of these flies have been found in Cucurbita maxima, Luffa acutangula and various squashes.

Dacus vertebratus, Bezzi.—Common in native gourds.

PIGEON PEA (CAJANUS INDICUS).

Dactylopius obtusus, Newst.—Is found in enormous numbers on this useful plant, which is its favourite host.

Tragocephala variegata, Bert.—Adults are prevalent during the hot season, October to March. Eggs found in April hatched in 10 days. The female gnaws a small hole in the bark of a lateral branch, in which an egg is deposited. Larvæ have been kept in captivity for over three months without pupating. Pupæ taken in the field produced imagos in 12 days. The larva, after feeding for a short time in a lateral branch, starts tunnelling down the main stem, during its transit making many vent holes, eventually pupating in a plugged cell. This may take place low down in the main stem or even in the root. A large exit hole denotes the escape of the adult. An infected shrub shows the following :—

Withering of attacked lateral branch, vent holes in the main stem, quantities of ejected fras on the ground under the tree.

Measurements of larvæ and pupæ :—

Larva at different stages : $\frac{5}{8}$ in., $1\frac{3}{4}$ in., $2\frac{3}{8}$ in.

Pupa : $1\frac{1}{8}$ in.

Control Measures.—Lopping off and burning all affected lateral branches ; once the larva has reached the main stem nothing can be done.

Lagria sp. (*Tenebrionidæ*).—Have been taken in ripe pods feeding on the peas. All instars present in the pod. Generally found in neglected fields, where old pods had been left on the trees.

The larvæ are black in colour, elongate and cylindrical, about $\frac{1}{4}$ inch long. Pupa brownish with thin abdomen.

Marasmarcha atomosa, Wlsm. (*Pterophoridæ*).—These small delicate moths, with their narrow divided forewings, have been taken hovering around the Pigeon Pea. The body of the larva is studded with spines and hairs radiating from tubercles. They feed openly on the green pods, the pupa closely resembles the larva.

Meloidæ occur at times in large numbers feeding on the leaves, the following have been noticed :—

Mylabris dicincta, Berlol.

Mylabris amplectons, Gerst.

Coryna ambigua, Gerst.

Ladies Fingers (Hibiscus esculentus).

Always a heavily parasitised crop, the following pests are recorded :—

Gelechia gossypiella, Saunders, Earias insulana, Boisd, Sylepta derogata, F. Prodenia litura, F.

INSECTS INJURIOUS TO TIMBER.

Bostrychidæ.

Dinoderus minutus, F.—All structures built of bamboo are in a few years reduced to dust, the first evidence of attack being minute holes leading vertically into the timber.

Bamboo which has been soaked for a few days in water is less liable to infestation.

Split bamboos painted with Cooper's dip (5%) gave good results, as all adults and larvæ were destroyed.

The following timbers have been attacked :—

Madagascar teak, slightly.

Jack-fruit (*Persea gratissima*). In one instance the bark was heavily infested.

Book covers are often ruined.

Longicornia.

Macrotoma palmata, F.—Larvæ of this species are common in the rafters (Mangrove. *Ceriops candolliana*) of the native huts.

Isoptera.

Termites (*Termes bellicosus, Smeath*).—Ubiquitous in its distribution, it is the worst timber pest in the island.

Imported European timber is reduced to ruin in a few years.

Indian teak is rarely attacked, Madagascar teak is more susceptible.

The structural timber (Mangrove. *Ceriops candolliana*) of the native huts is always badly infested, as also is the roofing made of platted cocoanut leaf.

Experiments are now being carried out on various timbers with different arsenical solutions.

INJURY TO LIVING TREES.

Termites have been recorded attacking the following trees :—

Seed and seedling cocoanuts (see page 85).

Young avocardo pears, roots badly infested.

Cloves (see page 85).

The identified Termites in our collection are: *Termes bellicosus, Smeath.* and *Rhinotermes putorius, Sjost.*

INSECTS INJURIOUS TO MISCELLANEOUS PLANTS.

Sweet Potato (*Ipomoca batatas*). The potato weevil.

Throughout the year large numbers of *Cyclas formicarius*, F. were taken. The eggs are laid singly on the tubers, and on hatching the larva at once tunnels into the potato. The adult beetles gnaw their way out of the tuber. The life cycle takes from 24 to 30 days. Many generations are produced during the year.

No control measures have been tried, natives were advised not to replant on infested ground.

The vines of sweet potatoes are occasionally attacked by the larvæ of *Aspidomorpha puncticosta, Boh.* The latter are conspicuous by their long anal process, which can be turned over the dorsum and is covered with dried excreta.

The flowers are also severely attacked by Blister Beetles (*Mylabris amplectens, Gerst. and Coryna ambigua, Gerst.*).

Cassava (*Manihot utilissima*).—This useful plant is exceptionally free from pests.

The only record is a Coccid (*Dactylopius virgatus.* var. *Madagascariensis*).

Sugar Cane. Lepidopterous borers (*Chilo sp.*) have been occasionally found. A Coccid (*Dactylopius virgatus.* var. *Madagascariensis, News T.*) has been observed at the base of the leaves.

Ground Nuts.—Coccidæ were found on one occasion attached to the roots and the nuts. The species awaits identification.

Bon. (*Moringa pterygosperma*).—*Lamiidæ,* Larvæ and pupæ of (*Pterotopha annulata, Chev.*) were obtained from the pods, feeding on the seeds.

Castor Oil (*Ricinus communis*).—The favourite food plant of Porthesia producta (see cotton pests, page 86).

Coccidæ (*Aspidiotus destructor, Sign*).—At times a severe infestation, the main stem being completely covered.

Tobacco.—From native crops no records of pests have been obtained. Several small plantations were visited during the year, the only insects captured were Reduviidæ (*Cosmolestes sp.*). I failed to find their prey.

Imported Seed.—The seedlings were attacked by cut-worms, later the young plants by Prodenia litura, and by a small locust (*Chrotogonus hemipterus, Schaum*).

The Cheroot Beetle (*Lasioderma serricorne, F.*).

Infected cigars and cigarettes are readily detected by the small round holes, which run through the cigars.

Complaints have been received from various dealers ; they were advised not to unpack cigars or cigarettes (arriving in tin-lined cases) until needed. Infected boxes should be placed in a large case lined with tin, the lid being felted and secured by strong clamps. They should then be fumigated with carbon bi-sulphide.

Roselle (*Hibiscus sabdariffa*).—A few experimental plants were attacked by Flea Beetles (*Nisotra weisei, Jac.*).

INSECTS INJURIOUS TO CITRUS AND OTHER FRUIT TREES.

Papilio demodocus, Esp.—A very common pest on young citrus trees. The eggs are laid singly on the edge of tender leaves. The immature larva is of a chocolate and white colour (resembling bird droppings) ; after the thirteenth day it changes to a bright green colour with a dorsal V shaped mark ; this stage lasts five days. The pupa is attached by a silken thread to a twig ; pupal stage 10 to 15 days.

Control Measures.—The larvæ being conspicuous, hand picking is efficacious.

Scale Insects.

Mytilaspis beckii, Newman.—Mussel scale. The worst enemy of the citrus trees, in many plantations the trees are encrusted, the main stem and laterals being covered, the leaves and fruits are also attacked.

Icerya purchasi, Maskell.—The fluted scale. Taken on various species of citrus trees, never a serious pest ; in other localities, however, it is recorded as being dangerous.

Lecanium sp.—Abundant on young citrus trees, oftener on unthrifty trees in association with " sooty mould." This fungus forms a black crust on the foliage, occasionally blackening the fruits ; it is however superficial, not penetrating the tissues of the plants.

Aspidiotus sp.—Very prevalent, leaves badly infested along the mid-rib.

Dactylopius obtusus, Newst.—Always present in small numbers.

Ceroplastes rubens, Maskell.—One record from young orange trees.

Two Weevils (*Alcides orientalis, Chev.* and *Cynaptoplus cervinus*) have been taken, apparently doing no damage.

Control Measures.—The following sprays have been used against these Coccidæ :—Rosin wash, whale oil soap, and petroleum emulsion.

The results were not satisfactory, as repeated sprayings were necessary, involving much time and expense. On the Government plantations, fumigation with hydrocyanic acid gas (as carried out in Egypt) would probably be the cheapest and most efficacious method of control.

THE MANGO (MANGIFERA INDICA).

Lecanium punctuliferum, Green.—On fruit and leaves.

Lecanium nigrum Nietn.—On fruit and leaves, commoner than the former ; also taken on Begonias.

Cryptorrhynchus mangiferæ, F.—Mango fruits are often found to be spoilt by the tunnels of an insect, which, emerging from the stone, eats its way out through the pulp. The insect is a short thick-set weevil, dark brown in colour, one-third of an inch in length. When disturbed, it draws its legs together feigning death. Eggs are laid in the young fruit, the larval and pupal stage is passed in the kernel, the adult beetles gnawing their way out through the pulp.

The beetles hide on the bark of mango trees or on the ground until the next flowering season.

Control measures.—Banding has been proposed.

INSECTS INJURIOUS TO SHADE TREES.

The African Almond (*Terminalia catappa*).—These trees are found throughout the two islands.

Bag worms (*Psychidæ*) are very prevalent, the species still remain unidentified. Attacked leaves have a characteristic appearance, large circular holes being eaten out by the larvæ. The cases of the larvæ are formed from the leaves of the food plant.

Control measures.—Many female cases were found to be parasitised by a Tachinid and a Dermestid larva.

Rain Tree (*Pithecolobium saman*).—A group of these trees were badly infested with *Dactylopius obtusus, Newst.*

Cinnamon (*Cinnamomum zeylanicum*).—A number of young trees at Dunga were attacked by the larvæ of a Tusseck moth, as yet unidentified.

Sterculia sp.—A handsome tree from 30 to 40 feet high. Their fruits consist of five or fewer, more or less woody follicles, radiating from a common centre and opening along their inner or top edge, each follicle containing several albuminous seeds. They are generally found near the sea.

Large numbers of black hairy caterpillars (*Pteredoa tavetensis Hall, Lymantriidæ*) characterised by a white process on the 9th and 10th segments. The hairy pupa is enclosed in a slight silken case, generally on the trunk of the food plant, but they may be found in any sheltered position some distance away. During the summer months (cool season) the larvæ congregate and form a shelter composed of silk and cast skins ; they become active as soon as sufficient leaves reappear.

Rhynchota (*Odontopuscon fusus Dist*).—Swarms of these bugs are always to be found on the trunk, sometimes whole branches are completely covered ; they feed on the albuminous seeds. As noticed in other species of Pyrrhocoridæ, they have a special predilection for animal food.

Silk Cotton Tree. (*Eriodendron anfractuosum*).

Dysdercus superstitiosus, Dist. is prevalent on the open bolls.

Baobab Tree (*Adansonia digitata*). Larvæ of *Pteredoa tavetensis, Hall* (see under *Sterculia sp.*) were taken on one occasion.

Coccidæ (*Aspidiotus trilobitiformis, Green*).

INSECTS INJURIOUS TO ORNAMENTAL PLANTS.

LEPIDOPTERA.

Brithys pancratii, Cyr.—Noctuidæ.

The larvæ are black with white spots, hairless, the head light brown in colour ; the adult measures $1\frac{3}{4}$ in. in length.

They are voracious feeders on all species of lilies ; the young larvæ are gregarious, feeding on the epidermis of the leaf ; later they separate and devour the whole of the plant. Pupation takes place in the soil, or at the base of the leaves. The pupa is black and measures $\frac{3}{4}$ in. Pupal stage 8 to 10 days.

Euchromia formosa Guer.—Syntomidæ.

The larva is clothed in tufts of hair, dull coloured and inconspicuous. They make a cocoon of silk and hair on the branches of the food plant.

They are common on all creepers belonging to the family Ipomoæ.

Glyphodes sericea, Drury.—Pyralidae.

Larvæ were taken on Gardenias. The adult larvæ average $1\frac{3}{4}$ in. in length ; they are of a semi-transparent greenish colour with four black spots on the dorsum. They are leaf rollers, living and pupating in twisted leaves but are not gregarious. Pupal stage averages nine days.

COLEOPTERA MELOLONTHIDÆ.

Entyposis impressa, Kolbe.—Larvæ were found feeding on the roots of Calladium and young Castor Oil plants.

Mausoleopis amabilis, Schaum.—Adults common on all ornamental flowers.

Brachycerus Atrox Gerst. (*Curculionidae.*)—In December enormous number of adults were taken around the tubers of lilies (*Amaryllis*). During the day, the adults hide in burrows near their food plant. In January, February and March larvæ were found in profusion eating into the centre of the tubers.

Pupation occurs either in tuber or soil ; eggs are deposited singly beneath the epidermis of the tubers.

SECTION IV.

OYSTERS IN RELATION TO PEARLS.

From time to time it has come to the notice of the Zanzibar Government that pearls were being found in the local oysters. During the early part of 1913 I was asked to enquire into the matter and offer suggestions.

A start was made by collecting the various species of local oysters and identifying them ; they are as follows :—

Margaratifera maxima.—Mother-of-pearl oyster. These are large shells, measuring from 4 to 6 inches in breadth ; extensive beds exist off the east coast of the Island.

Pinna sp.—Are abundant ; they occasionally carry blister pearls.

Perna sp.—Occur in considerable quantities around the coast of the Island ; blister pearls have been found.

Margaratifera vulgaris.—The Lingah shell. This is the oyster found in Ceylon and other parts of the Indian Ocean. Quantities of shells are located on sandy beds around the islands of Zanzibar and Pemba, generally in shallow water ; in some places they are exposed during neap tides. Large numbers have been obtained and examined for pearls. They were, however, few in number, of poor size and quality. A journey was undertaken to Ras Fumba with the following results :—

The diving took place between Ras Fumba and Kwale Island ; the current was strong, tide falling, depth about 3 fathoms ; the bottom was composed of sand with lumps of conglomerate. Four canoes were out with one diver in each ; their catches were as follows :—

Canoe No. 1	588	Oysters.
„ 2	160	„
„ 3	230	„
„ 4	200	„
Total	1,178	Oysters.

The average measurement of the oysters was 2½ to 2¾ inches. Ninety small inferior pearls were obtained, mostly lying in the mantle. A number of shell blisters were opened, no pearls were found inside.

As the oysters were of such small size, a number were kept and examined microscopically, those measuring 2½ inches showed ripe ova and spermatozoa.

Enemies of the Oyster Beds.

Large Ray-fish, a species of Balistes (*file-fish*), Star-fish and Whelks are recorded. Cestodes were obtained from the Ray-fish ; they were sent to Professor Herdman, F.R.S., for identification (in view of the theory of the Cestode formation of pearls).

Professor Herdman, F.R.S., was furnished with full details and has made the following remarks :—

"1. There seems to be plenty of oysters in your district and they are easily obtainable.

"2. They are of small size and from your figures the pearl yield is small."

He has asked the following questions :—

1. Why do the oysters not grow larger and have more valuable pearls ?
2. What limits their growth ?
3. Do they die at an early stage ?
4. Have they natural enemies ?
5. Do the natives fish them for food ?

Most of the questions are at present unanswerable. As I have mentioned, there are several natural enemies, and a large number of oysters are captured by the natives for food. In my opinion, the beds inshore are extensive and are continuously fished by the natives, therefore great denudation has taken place.

It is possible that beds are existent in deeper water and may harbour oysters.

The following work remains to be undertaken :—

A small survey should be made to investigate certain areas in deep water, and careful dredging records should be kept. If larger oysters are found in any numbers the beds should be marked and preserved by the Government. I also think that some of the inshore beds should be carefully protected for two years and that from time to time they should be examined and the oysters measured.

Owing to lack of time and equipment no great headway has been made with this work ; the observations made up to the present were obtained at odd moments.

I recommend that a small survey of the beds should be made during next year with the help of the Port Office ; a launch will be necessary.

With such data, it may be possible for the Government to lease the fishing of the beds. It would not be advisable for the Government to work them on their own account.

SECTION V.

ECONOMIC FISH.

A collection of the edible fishes of Zanzibar is being formed ; they will be dispatched at a later period to the British Museum for identification.

The fish inimical to mosquito larvæ have been mentioned in Section 1 (page 77).

No work has yet been undertaken concerning the migration, spawning, and seasonal prevalence of fish.

The blood and stomach contents of all fish will be examined. The local fish are of extreme importance, as they form one of the chief articles of food both for Europeans and natives. One fish of the family Gymnodontos (*Diodon sp.*) is notoriously poisonous.

The principal types of fishing-gear used by the natives are :—

1. Lines, fish stakes, traps ; these are used for bottom feeding fish.
2. Seine and drift nets for pelagic or surface feeding fish.

The hand-lines are long, baited with many hooks attached by snoods ; they are buoyed, shot and hauled in after being down several hours.

Traps are baited and placed below low water mark.

Stakes are to be found along the whole coast ; they are made of various reeds forming a wall ending in a circular enclosure with a small opening ; the fish are removed at low water. The umbrella net is often used in shallow water, the fisherman watching a shoal and casting over it.

Pelagic fish are captured by means of drift nets ; these are perpendicular walls of different meshed netting. They are buoyed, weighted and sunk to a depth at which the fisherman judges the shoals to be. The fish striking against them are enmeshed by the gills.

SECTION VI.

BIRDS BENEFICIAL AND OTHERWISE.

A fair collection of birds has been formed ; a number have been identified by the experts of the British Museum.

The economic object of the collection is to examine :—

1. Ectoparasites.
2. Blood parasites, in view of the recent work on the natural reservoirs of harmful Protozoa.
3. Internal parasites.
4. The stomach contents (to show the nature of the birds' food).

Eventually we wish to have a collection of Zanzibar birds with all the above mentioned data.

From an entomological point of view the insectivorous birds are of great importance. In some instances we have been able to recognise even the species of insect on which the bird feeds.

Other birds are distinctly harmful, for example, the small Barbets (*Barbatula bilineata*), as they are the chief dispersers of the vegetable parasite, *Loranthus dregei.*

Several birds have been found harbouring blood parasites; they are mentioned in Section 8.

The mammals are being examined in a like manner.

SECTION VII.

HELMINTHOLOGY.

The following ova and adult worms have been recorded by the M.O.H. as occurring in humans.

Nematoda.

Ascaris lumbricoides.
Ankylostoma duodenale.
Microfilaria bancrofti.
Microfilaria perstans.
Trichuris trichiura.

Trematoda.

Schistosomum hæmatobium.

Cestoda.

Tænia saginata.
Tænia solium.
Stilesia centripunctata. (In goats.)
Moniezia sp. (In goats).

A collection of Helminths has been made from various mammals, birds and reptiles; they will be dispatched shortly to London for identification.

Filaria medinensis has not been found in Zanzibar, but Cyclops sp. is common in all standing collections of water.

SECTION VIII.

BLOOD PARASITES OF MAMMALS, BIRDS, REPTILES, ETC.

During the last few months I have examined the blood of every mammal, bird, reptile and batrachian, which has been received at the Museum of the Health Office.

Although the importance of the study of the blood parasites has only been recognised in comparatively recent years, nowadays the significance of these parasites is well recognised as well as the necessity of studying them comparatively, since we know that many of the gravest diseases of man and of animals are caused by them. I need only mention such diseases as malaria, sleeping-sickness, kala-azar, trypanosomiasis of stock, etc., to remind you of this.

I have not attempted to name any of the parasites mentioned here.

In the present state of our knowledge it seems better to tabulate the hosts and give the general characteristics or type of the parasite.

EMBRYO FILARIÆ.

Domestic Dogs—Microfilariæ have been found in the blood stream; adults in the left ventricle of the heart.

Java Sparrow.—Microfilariæ in the blood.

HÆMOGREGARINIDÆ.

Monitor Lizard (*Varanus sp.*)—Large intracorpuscular forms.
Python.—Heavy infection, large intracorpuscular forms.

HÆMOPROTEIDÆ.

Small Sun-Birds.—Hæmoproteus sp.

Guinea Fowl.—Hæmoproteus sp.

In the above mentioned Python, large Porocephalidæ were found in the body-cavity.

SECTION IX.

MUSEUM OF THE DEPARTMENT.

All material which is likely to be of economic importance has been kept. The object of the Museum is twofold; firstly, that the M.O.H. and other members of the Medical staff may have a reference collection at hand; secondly, if at some future date European planters should take up land in Zanzibar, insects, etc., injurious to economic crops can be quickly demonstrated. It is the aim of this department not to have a general collection of the Zanzibar fauna and flora, but that all specimens should have some direct economic value.

Specimens which we consider of no economic value are dispatched to the British Museum.

During the year many residents and visitors have visited the Museum.

SECTION X.

TRAVELLING.

Pemba has been visited on three separate occasions; collections of Culicidæ and other blood-sucking Diptera were made. Investigations were also carried out in relation to the prevalence of East Coast Fever. The same conditions exist as in Zanzibar (see my report on East Coast Fever published in 1912). Insects injurious to economic crops were also collected; one European, interested in agriculture, was given advice and help regarding cotton and various other pests.

Two expeditions have been made through the south of the Island. The itinerary was as follows:—Zanzibar, Chwaka, Wegu, Jembiani, Mkunduchi, Muyuni, the Island of Uzi, Ungujaku and Bwleo. During the expedition collections of harmful insects were made; in some instances the Masheha (headmen) were instructed in methods of eradication.

A long stay was made at Mkunduchi, where numbers of cattle were examined for East Coast Fever.

One expedition was made to the north of the island, including the island of Tumbatu ; important cattle centres were visited and investigations carried out.

Owing to the small area of Zanzibar most points are easily accessible.

From time to time small expeditions are undertaken to investigate the condition of the various crops. On receipt of any information relating to economic Zoology, a personal visit is made.

Nairobi was visited on two separate occasions to confer with Mr. Montgomery on various veterinary subjects, and with Mr. Anderson on entomological questions.

SECTION XI.

SPECIAL WORK.

TRYPANOSOMIASIS.

In cattle is of rare occurrence ; sporadic cases are met with time to time, many of them recover after a long period of sickness.

Tsetse have never been found on the islands. The commonest blood-sucking flies are Stomoxys calcitrans and nigra, Tabanus tæniola and fraternus. Experiments were undertaken to ascertain whether any of these flies were transmitters ; up to the present, even with direct transmission, the results are negative. The trypanosome has been identified by Sir David Bruce as Trypanosoma pecorum, by Prof. Laveran as Trypanosoma congolense. The average measurement of the trypanosome is 13·4 microns. A noticeable feature has been the difference in the virulence of the strains. The first strain obtained from a horse was very fatal to dogs, goats, and cattle ; six guinea-pigs were inoculated, two succumbed to the disease.

The second strain, obtained from a native cow (still living after a period of two years), was far less virulent ; goats sub-inoculated showed trypanosomes, but none have succumbed.

On trying cross inoculation, recovery from cow strain did not protect against horse strain.

The animals were kept on an island three miles distant from Zanzibar ; one bull imported from Italian Somaliland was kept in close contact with others showing numerous trypanosomes ; no infection took place, although Lyperosia minuta was present in great numbers.

ANIMAL INOCULATIONS AND REACTIONS.

(*a*) Trypanosoma pecorum (Horse Strain).

Experiment Number.	Duration of Disease.	Remarks.		
Dog No. 1	25 days	Enlarged	Spleen,	Death.
Dog No. 2	39 „	”	”	”
Dog No. 3	16 „	”	”	”
Dog No. 4	12 „	”	”	”
Dog No. 5	17 „	”	”	”
Dog No. 6	14 „	”	”	”
Dog No. 7	12 „	”	”	”
Dog No. 8	21 „	”	”	”

All the eight dogs received 5 c.c. of blood,
Average duration of the disease in dogs, 19 days.

Guinea-pig 1	41 days	Enlarged Spleen, Death.
Guinea-pig 2	—	No reaction.
Guinea-pig 3	—	”
Guinea-pig 4	—	”

All the four guinea-pigs received 2 c.c. of blood.

Bull 1	67 days	Enlarged Spleen, Death.

Received 20 c.c. of blood.

Monkey 1 (*Cercopithecus sp.*)	—	No reaction.

Received 5 c.c. of blood.

Goat 1	17 days	Death.

Received 5 c.c. of blood.

(*b*) Trypanosoma pecorum (Cow Strain).

Five goats were inoculated; all of them became infected; trypanosomes persisted in the blood for varying periods. Several dogs have been inoculated with no mortality; one of them has shown trypansomes in its blood daily for a period of two months.

Work is still being continued on this trypanosome; as we now have a number of recovered animals, serum experiments will be started.

From the above results it will be seen that T. pecorum in Zanzibar does not cause great loss among cattle.

More cases are reported during the rainy season, when all species of blood-sucking Diptera are very prevalent.

One European planter lost two out of seven cattle; all were heavily infected. Other cattle have been examined and T. pecorum found; the majority of them recovered.

Among our experimental animals, the disease reappears from time to time, generally after a period of hard work or decrease in rations.

In many instances no clinical symptoms were evident.

(*c*) Introduction of Swine Fever Virus to Eradicate Wild Pigs.

Wild pigs are a great pest in Zanzibar and Pemba.

It was decided to try and introduce Swine Fever. Through the kindness of Mr. Montgomery, Veterinary Pathologist to the B.E.A. Protectorate, we obtained some virus; the first lot unfortunately proved inert, the second was extremely virulent. With this virus the following experiments were undertaken:—

Pig No. 1, *Wild from Pemba.*—Inoculated with 3 c.c. of mixed virus on 27th February, 1912. Died on 1st March, 1912. Post-mortem revealed typical Swine Fever lesions.

Pig No. 2, Wild from Pemba.—Was placed in contact with Pig No. 1 on 27th February, 1912. Died on 9th March, 1912. Post-mortem showed Swine Fever lesions.

The virus was now kept running through domesticated pigs.

From time to time both wild and domesticated pigs were inoculated and liberated in different parts of the Island. No epidemic of Swine Fever followed.

Two further experiments have been tried.

1. Two wild pigs were captured; the place being most carefully noted The pigs were inoculated with 3 c.c. of virus and taken at once to the original place of capture and liberated. (The place was reached within a few hours.)

No epidemic resulted from this measure.

2. Pigs were fed on bananas and sweet potatoes, which had been inoculated with virus; the pigs did not contract the disease. This experiment was repeated by Mr. Montgomery with a negative result.

In all probability wild pigs do not form large herds; generally one sees single boars or a sow with her young. As the virus is very delicate and easily killed, one can understand the failure of the experiments.

CONCLUSION.

The work of this Division has now been carried on for two years practically without any funds. There are only two native boys employed, who spend most of their time in general collecting. The entire correspondence, keeping of records, labelling and classification work in the Museum has fallen on my shoulders.

I sincerely trust that a certain sum of money will be allocated next year.

To put the Zoological and Entomological Research Division on a proper basis, I need the following staff:—

One clerk, to take charge of correspondence, and labelling of Museum specimens.

Six general duty boys. Their work would be divided as follows:—

Post-mortem and skinning	1
To attend to experimental animals, and help with minor operations, such as inoculation, etc. ...	1
General attendant, to clean laboratory and instruments	1
To act as general collectors, one of them to be continuously employed in Pemba	3

Such a staff would entail the expenditure of about Rs. 160 per month, whilst the cost of general maintenance, apparatus, animals, etc., will amount to a further £200 per year. If it had not been for the willing co-operation of Major Skelton, R.A.M.C., the greater part of my work would have been impossible. My thanks are due to him for his very valuable advice and help on all matters relating to scientific research.

My thanks are also to be tendered to Mr. Guy A. K. Marshall, Scientific Secretary of the Imperial Bureau of Entomology; Sir David Bruce, F.R.S.; Mr. Montgomery, Veterinary Pathologist to B.E.A.; Mr. T. Anderson, Entomologist to B.E.A.; and to the experts of the British Museum, who have so promptly identified all material supplied to them.

From a scientific and educational point of view the work thus started cannot fail to be of great use to the Zanzibar Government. A time will come when, perhaps, elementary agricultural methods will be taught to the natives; at present their endeavours in this direction are most primitive.

I thoroughly concur with Major Skelton that the laboratories of the Public Health Department should represent Science, and that eventually all scientific workers should be located together, so that their combined knowledge may be correlated. In a small Island like Zanzibar, with Laboratories which in equipment and convenience are equal to most in Africa, it would be waste of money to erect others.

School of Hygiene & Tropical Medicine
LIBRARY
[illegible] FEB. 1934

[illegible] School of [illegible]